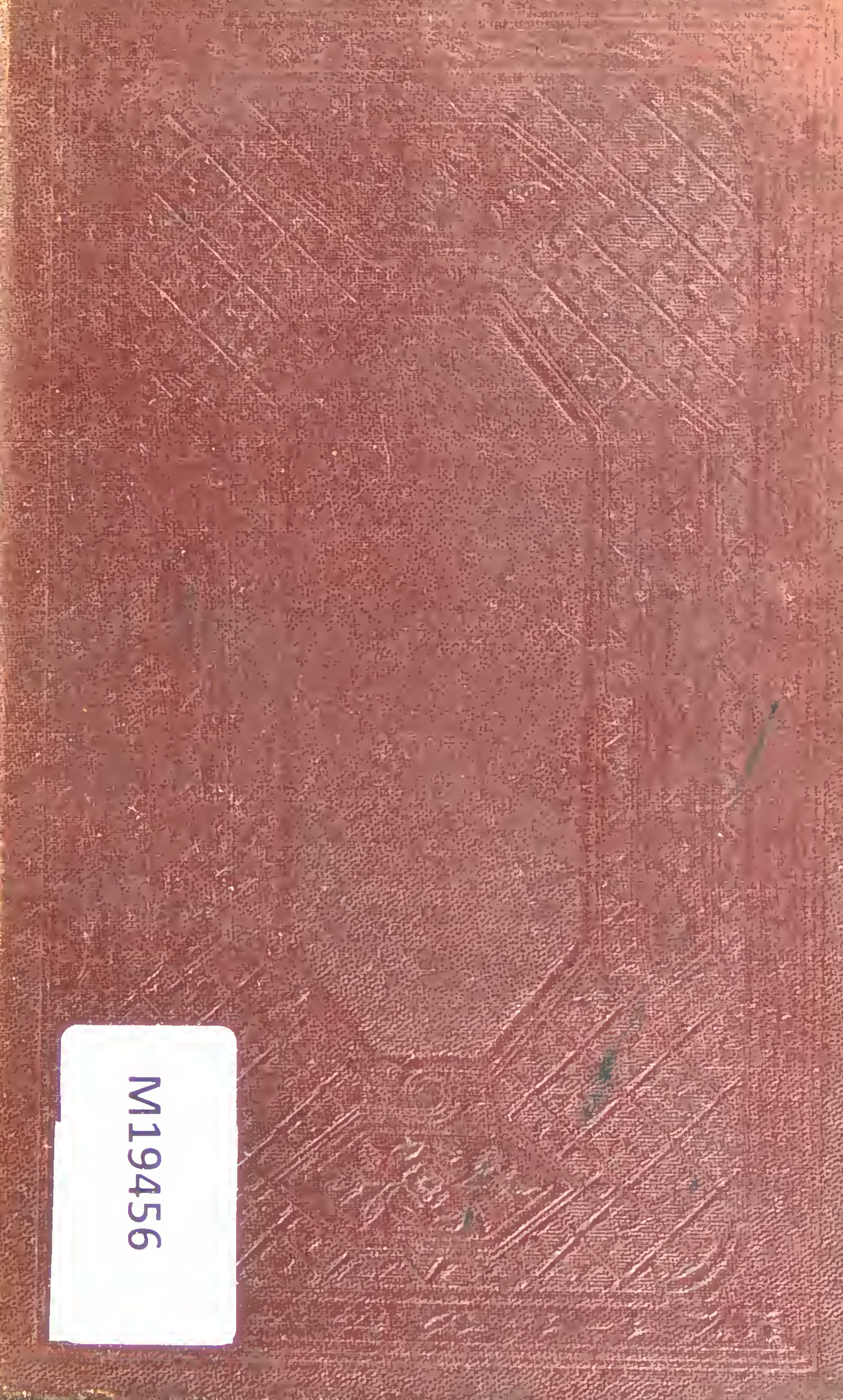

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SURGICAL APPLIANCES

AND

MINOR OPERATIVE SURGERY.

BY

THOMAS ANNANDALE, F.R.C.S. EDIN.,

LECTURER ON SURGERY;
ASSISTANT-SURGEON TO THE EDINBURGH ROYAL INFIRMARY;
LATE DEMONSTRATOR OF ANATOMY IN THE UNIVERSITY OF EDINBURGH,
ETC., ETC.

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PREFACE.

THE Author has endeavoured, in the pages of this little work, to give a concise description of those surgical appliances, minor operations, and other means which are used to treat simply but efficiently the diseases and injuries met with in ordinary surgical practice.

The illustrations have been carefully prepared, so as to make the modes of application of the various apparatus, and the methods of operating, as intelligible as possible; and the Author, therefore, trusts that this book will be found useful to the student in his surgical studies, and in his hospital and dispensary practice.

HOPE STREET, CHARLOTTE SQUARE,
EDINBURGH, *April*, 1866.

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SURGICAL APPLIANCES

AND

MINOR OPERATIVE SURGERY.

CHAPTER I.

DUTIES OF HOUSE-SURGEONS AND DRESSERS.

The duties of a house-surgeon or dresser vary somewhat in different hospitals. In the Edinburgh Infirmary each acting-surgeon has for his staff one resident qualified house-surgeon, two or three non-resident clerks, who are generally senior students or dressers, promoted for diligence and intelligence, and from six to twelve dressers, also non-resident. In some other hospitals each surgeon has connected with his wards one resident house-surgeon and two or more dressers; while in other hospitals, again, every acting-surgeon has his resident or non-resident clerks and dressers, who are under the superintendence of a resident qualified house-surgeon, who has charge of all the wards in the hospital under the supervision of the acting-surgeons.

It is therefore difficult to give any very special account of the duties connected with these appointments, so as to be applicable for all hospitals or infirmaries; but I will now endeavour to give a few hints which may be useful to any house-surgeon, dresser, or surgical student.

Surgical cases require constant and careful attention, for, if neglected in any way, injurious consequences may result. For instance, if a bandage be too tightly applied to a limb, and this defect be not remedied, mortification may ensue in a very few days. Again, serious bleeding may take place if professional assistance is not at hand, and either kill the patient in a short time, or so weaken him that his recovery is delayed.

Surgical patients should, as a rule, be examined at least once a-day, oftener if necessary, and any change in the disease or injury from which they are suffering, or any derangement in the dressings or other appliances, carefully inquired into, and treated or remedied.

The rules for the admission of patients vary in different hospitals. In the Edinburgh Infirmary each surgeon has certain days of the week on which he receives all patients (unrecommended) who may apply for admission, and makes them in-patients or out-patients as he thinks proper. All patients, however, who are specially recommended to one of the surgeons are admitted under that surgeon's care on any day or at any hour. It is usually the duty of the house-surgeon, clerk, or dresser, in the absence of the visiting-surgeon, to receive patients suffering from disease or injury, and to determine whether or no they should be admitted into the hospital. Patients should only be admitted when their disease or injury is of such a nature as to prevent them being treated as out-patients. or when they have been specially recommended for admission, or when they have come some distance from the country. The house-surgeon or dresser in charge should carefully examine such patients when admitted, and if they are suffering from some serious disease or injury which requires an immediate capital operation, the acting-surgeon or assistant-surgeon should be sent for. The house-surgeon or dresser ought always to direct the notice of the visiting-surgeon to any new cases which may have been admitted since his last visit, and also inform him of any changes which may have taken place in the symptoms of patients in the wards. When a patient is admitted, his name and other particulars of his case should be entered in the case book by the gentleman whose duty it is to do so. In all instances where it is possible, the patient's case should be taken before any treatment has been adopted or operation performed. The house-surgeon or dresser has usually to prescribe for the numerous out-patients who apply for advice. Many of these cases are trivial, but a study of them will always be useful to the young surgeon.

Cleanliness and proper ventilation in the treatment of surgical cases are of essential importance, more especially when there are a number of patients congregated together, as in the wards of an hospital; and the house-surgeon or dresser should, therefore, see that the wards, bed-linen, body-linen, and the patients themselves, are kept in a clean and decent state. Many patients, when first admitted into an hospital, are in a filthy condition, both as regards their clothes and persons. Such patients should have the benefit of a warm bath as soon as possible, and their clothes removed and purified. Their hair, if long, should also be cut short, for it is usually only a receptacle for filth, both living and dead. Unless these precautions are attended to, it will be impossible to prevent lice and other parasites from haunting the patients in a ward. The body and bed-linen ought to be changed at least once a-week or fortnight, if possible, oftener if required, and the floors of the ward kept clean and dry. The patients should have their hands, faces, and other exposed parts of the body washed or sponged once or twice daily, and a warm bath whenever advisable. All dressings and evacuations removed from patients should be taken out of the ward at once, and disinfectants freely used if these have left any unpleasant smell behind. It is a good thing to allow a little fresh air to pass through the wards, by opening the windows for a few minutes after the dressing hour, provided this can be done without injury to the patients. If there should happen to be any infectious disease in the hospital, great care should be taken that the dressings removed from affected patients should not come in contact with the other sores or wounds in the wards. Chloride of lime, Condy's fluid, charcoal, or other disinfectants, should be employed, and kept constantly around the infected patients, and also in the unaffected neighbouring wards. Especially is it necessary, during the summer months, to keep wounds and sores clean, for if the discharges be allowed to accumulate, maggots are very apt to be bred in large quantities, and add to the discomfort of the patient.

All surgical patients should be handled with gentleness. Many surgical diseases and injuries are attended with considerable pain, which may be much aggravated by injudicious fingering or movement. Patients should always be treated with kindness and courtesy, and although the stupidity and surliness of some persons who apply for advice at hospitals or dispensaries are often very trying to the temper, they should be borne with as much as possible, for such persons are frequently suffering from some disease or injury, or from the dread of the means which may be necessary for their relief. Even if a patient's disease or injury admits of no remedy, a little care and kindness on the part of their surgical attendant often soothes and relieves their feelings. Hospital patients, with few exceptions, like those of their surgical attendants best who have a cheerful manner, and who will listen to and sympathise with all their little troubles. Many of these patients are from some distance from home and their friends, and consequently they have many little anxieties to think of. These anxieties, although they may be about the most trivial matters, will often retard the patient's recovery, if not relieved by a little proper sympathy.

The house-surgeon or dresser is frequently addressed, either by letter or in person, by friends of or persons interested in a patient under his care. Such inquiries ought always to be promptly and courteously replied to; for if this is done, it is taken as a proof that the patient is under careful observation and treatment. It not unfrequently happens that officious people constitute themselves friends of a patient, and annoy the house-surgeon or dresser by unnecessary inquiries as to the nature and result of the disease or injury. It is never worth while quarrelling with such persons, and they may always be dismissed with some little civility or apology as to the value of time. The house-surgeon or dresser is often also asked to give certificates testifying that a patient is unable to follow his or her employment, owing to accident or disease. Some hospitals have printed forms of these certificates, which only require the date and patient's name to be filled in, and then to be signed by the house-surgeon or dresser. In hospital or other practice, where there is no regular form of certificate, one like the following will do:—

I hereby certify that *John Smith* was admitted into this hospital on the 28th February, 1865, suffering from *disease of the knee-joint;* and that he is unable to follow his employment.

Name ....
Address ....
Date ....

OR,

I hereby certify that I am attending *Peter Wright,* who is suffering from a *fracture of the leg;* and that he is unable to attend to his usual work.

Name..
Address..
Date...

Certificates are often also required by the police or other authorities in regard to the present condition of patients, or the nature of injuries which they have sustained. The following form is the one used in Scotland:—

I certify, on soul and conscience, that *Joseph Laing* was admitted into this hospital on the *9th of May* 1865, *at* 10 *o'clock* P.M.; and, on examination, I found that he was suffering from a *compound fracture of the skull*, and a *simple fracture of the right collar bone.*

Name..
Address..
Date...

In England, the form of certificate for these cases is, "I hereby certify," &c.

If a house-surgeon or dresser be asked to testify to the cause of a patient's death, he should give an accurate, intelligible, and brief report, remembering that he may have to undergo an examination in Court upon it, and upon the other facts of the case. This remark refers to all reports or certificates given in connection with medico-legal cases.

In cases where the cause of death is obscure, the house-surgeon or dresser should never, if possible, give a certificate until he has satisfied himself, by a *post-mortem* examination, as to the true nature of the case.

Most hospitals possess printed rules—a copy of which is usually hung up in each ward—for the proper conduct and duties of the nurses and patients, and it is the duty of the house-surgeon or his representative to see that such rules are obeyed. It is his duty to see that the nurses are kind and attentive to the wants of the patients, regular in administering food and medicines, and proper in their general conduct. It is also his duty to see that the patients themselves are civil and proper in their conduct to the nurses, cleanly in their habits, and that they take their food and medicines as instructed, and do not interfere in any way with the treatment of their disease or injury.

One of the few unpleasant but necessary duties of a house-surgeon is, to settle disputes which occasionally arise between nurses and patients. He should always carefully inquire into the matter of dispute, and endeavour to do justice impartially. If a patient commits a flagrant breach of the laws of the hospital, or becomes insubordinate in any way, the only course to pursue is, to dismiss him or her immediately, taking care to mark on his or her card, or enter in the hospital-book, the reason of his or her discharge. If bad conduct in one patient of a ward be passed over, the other patients are very apt to become troublesome also; and, therefore, the best cure for this state of matters is, to get rid of the primary offender at once, when it generally happens that any spirit of discontent in the ward disappears. One of the petty offences frequently committed in the wards of an hospital is that of smoking, and it is a very difficult thing to put a stop to this practice altogether, more especially as a pipe to many patients is both meat and drink. From my own experience in hospitals, I have always found it the best plan to permit patients to smoke, but only at certain times, and never during the hours at which the surgeons, visitors, or managers visit the wards. Early in the morning and at night are generally the most convenient hours for the purpose; but smoking should never be allowed at all, if it is in any way distressing to other patients in the ward.

Another annoyance in connection with hospital patients is the practice of smuggling in forbidden articles of food or drink by their friends. There is usually an hour or two set apart every day in some hospitals, in other hospitals only on certain days in the week, during which the friends of the patients are admitted, and this is too apt to be made an opportunity for conveying improper articles of diet contrary to the rules of the hospital. Although patients' friends are generally subjected to examination at the hospital gate before admission, they often manage, by hiding the forbidden articles in their boots or about their persons, to escape detection, and convey to the patients something which may be most injurious, and interfere with the treatment of their disease or injury. Friends of patients who act in this way often do so from mistaken kindness; but when they are detected, they must be seriously reprimanded, and, if the offence be repeated, they must be forbidden admittance to the wards.

The successful progress of surgical cases depends in great measure upon skilful and careful nursing, and therefore it is of great consequence that surgical wards should be provided with experienced nurses. The head-nurses of our large hospitals are, as a rule, most intelligent and experienced women, and the house-surgeon or dresser will do well to treat them with respect (especially before patients) and with kindness and courtesy, for they are brought so constantly and intimately in contact with one another, that, unless there is perfect understanding between them, the various duties connected with the wards cannot go on satisfactorily. A house-surgeon or dresser will often be able to receive a valuable suggestion or hint in regard to the treatment of a case from an experienced nurse, who has gained her knowledge from constant and long observation.

The under-nurses are not generally so experienced as regards nursing, but they are important elements in an hospital, as the night-duty and the cleaning of the wards and patients usually devolve upon them. It is, therefore, important to get willing, sober, and active women for under-nurses. A little notice and kindness on the part of the house-surgeon or dresser will generally encourage these women, and make them more attentive and diligent in the wards.

It is the duty of the house-surgeon to exercise some supervision over the dressers and other students attending the wards, and to see that they do not injudiciously handle or interfere with the patients. In doing this he should always treat these gentlemen with courtesy, and be ready to teach them their duties, and give them any instruction or hints in connection with the cases.

The house-surgeon or dresser frequently comes in contact with the chaplain, governor, matron, secretary, and other officials of the hospital, and I need scarcely here say that his conduct should be that of a true gentleman under all these circumstances. Unpleasant matters may occasionally require to be discussed; and although he must not allow his professional position to be encroached upon, it will generally be found that, by courtesy and some little forbearance, if need be, he will not only bring the affair to a satisfactory conclusion, but will retain the respect of the officials of the hospital.

INSTRUMENTS REQUIRED BY A HOUSE-SURGEON OR DRESSER.

I wish now to say a few words on the surgical instruments which a house-surgeon, dresser, or surgical student requires for the performance of his duties, as I know that the young student is often at a loss in selecting these. I shall only here give an account of those instruments which are essential for ordinary house-surgeons' or dressers' work, as it will be more convenient to describe the other varieties in connection with the particular operation in which they are employed. The following are the instruments which every house-surgeon or dresser ought to possess. They are illustrated in plate 1:—(1), A pair of dressing forceps; (2), A pair of dissecting forceps; (3), One or two pairs of artery forceps; (4), A pair of scissors; (5), Two or three bistouries of different shapes; (6), One or two silver probes; (7), Two or three needles

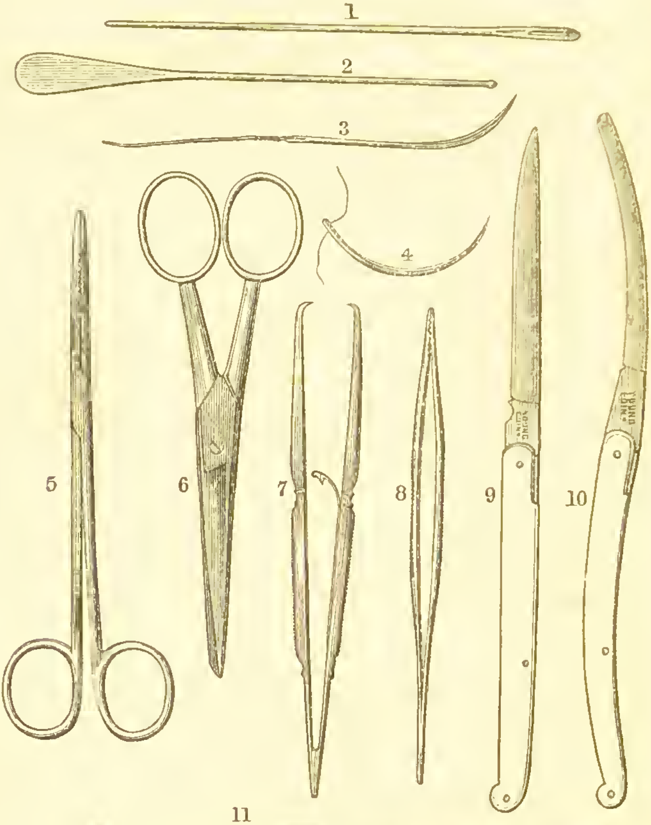

PLATE 1.

for introducing wire or thread sutures. These instruments are, for convenience, usually contained in a small leather-case, and constitute what is commonly called a "pocket" case. In addition to the instruments enumerated, a pocket-case should contain some strong silk thread, some silver wire, and some small harelip needles or pins. A little lint, and a small portion of common adhesive plaister, should also be neatly folded into the pocket-case. In most surgical pocket-cases it is customary to find an instrument for holding caustic, but this is usually very inefficient for the purpose, and is not an essential element of the case. It is much better to have the caustic fastened into a common quill, and not introduced into the case at all.

Dressing Forceps, fig. 5.—This instrument is sometimes called polypus forceps. It is generally employed for introducing or withdrawing dressings, for removing foreign bodies, or extracting a polypus from the ear or nose, and, therefore, in selecting one of these forceps, it should be seen that the two blades work freely on one another, and that their points meet correctly, and are able to grasp bodies firmly.

Dissecting Forceps, fig. 8.—This is the same instrument which is used in the dissecting-room. It is employed in those surgical operations where more or less dissection is required, and may also be used to seize arteries in order that they may be tied, or to remove foreign bodies of small size. A pair of dissecting forceps should be chosen with the blades accurately fitting at their points, so that they can grasp the finest texture, and retain a firm hold of it. The points of this instrument ought not to be too sharp.

Artery Forceps, fig. 7.—This is the kind of forceps which is used to lay hold of the divided ends of arteries, in order that a ligature may be placed round them. This instrument is also constantly employed during the administration of chloroform, to draw forward the tongue if the patient's breathing becomes affected; and it may be used to lay hold of small tumours, or other portions of texture which require to be removed. In selecting these forceps, a pair should be chosen in which the teeth at the extremity of the blades fit accurately into one another when closed, and which have their spring or catch working easily and securely. This kind of forceps is made of different shapes, but the principle in all is the same.

Scissors, fig. 6.—Several varieties of scissors are used by surgeons, but I have figured a pair which, for all ordinary dressing purposes, will, I think, be found the most useful. The scissors contained in many pocket-cases have their blades set more or less at an angle with the handles, but the instrument I have figured is of a more convenient shape. Another kind of scissors, which is constantly used by the surgeon to remove loose skin or cutaneous growths, is one which is curved in the blades and blunt at the points; but it is not easy with this instrument to cut in a straight line, and, therefore, dressings and sticking-plaister cannot be so accurately shaped with it. A proper pair of dressing-scissors ought to have the blades fitting and working well together along their whole length. For ordinary purposes their points should not be too sharp.

Bistouries or Knives.—Several varieties of bistouries are used by the surgeon to make incisions and perform operations. The common scalpel may be employed in some instances, but most surgeons prefer a knife which is longer in the blade than the scalpel, and not so much rounded off at the point. I have given illustrations of the principal varieties of the bistoury at figs. 9, 10, 11. The knives which I have figured are those which ought to be contained in a pocket-case. For the sake of convenience, these knives are generally connected to a handle, which admits of the blades being closed as in a pocket-knife; but these same instruments are also connected to fixed handles, and are constantly thus used by surgeons, only, in the latter instance, they require a special case to contain them.

The Straight Bistoury (fig. 9) is the one which will be found very useful for making incisions, and performing the minor operations of surgery.

The Curved-probe-pointed Bistoury (fig. 10) is merely a bistoury made much narrower in the blade than the straight one, curved in shape, and with a probe or blunted portion at its point. It is an extremely useful instrument, and is very much employed in surgery. This knife should have a distinct blunted extremity. It is often made with the blunted portion not sufficiently marked.

The Curved-sharp-pointed Bistoury (fig. 11) is the same as the last instrument, only sharp at the point. The one I have figured is a modification of the original instrument proposed by Mr Syme, and usually termed Syme's abscess knife. It is a very useful instrument for opening superficial collections of matter.

A pocket-case should contain the three kinds of knives that I have enumerated.

Probes.—A pocket-case ought to contain at least two probes, which are best made of silver. I have at fig. 1 illustrated a probe which has an eye at one end, and at fig. 2 another which is more pliable, and has at one end a short flattened handle. These two kinds will be found to be the most useful.

Needles.—A pocket-case should contain one or two needles for introducing wire sutures. The one shown at fig. 3 is the best for the purpose. This is Professor Lister's needle. It has a groove running down each side, from its eye to its head, for the reception of the wire, which is adjusted in the way shown in the engraving. Two or more needles are also required for introducing silk or thread sutures. These should be of different sizes and curves. I have given, at fig. 4, a medium-sized one, with a small piece of thread through its eye. A threaded needle is sometimes called an "armed needle."

These, then, are the instruments which a house-surgeon or dresser's pocket-case should contain; and I would only add, that they should always be kept clean, and the knives and needles sharp, as the surgeon may be called upon at any moment to use them.

CHAPTER II.

APPLICATION OF HEAT AND COLD. DRESSINGS. BANDAGING.

THE application of heat is much more frequently required in the treatment of surgical diseases and injuries than the application of cold, for the use of the former is, in the majority of cases, safer, and its employment more grateful to the patient than the latter. Heat may be applied either in a dry or moist form.

Dry Heat.—It is this kind of heat which is generally placed in contact with the surface of the body, to raise its temperature when it has become lowered from any cause, as, for instance, in cold shiverings or collapse. This heat is often also very efficacious in relieving pain of a neuralgic or other nature. Dry heat is usually applied to the body by means of tins or bottles filled with hot water, or by heated bricks, or pieces of metal, such as the common iron of the laundry. The hot bottle, brick, or metal, should not be applied directly to the body, but should have a piece of thick flannel or other cloth wrapped round it. In certain cases, great heat used in this way can be borne, and is sometimes required before pain is relieved; but when a patient is unconscious, care is necessary in employing it, for it occasionally happens that, owing to the insensibility of the patient, too great heat is brought in contact with the skin, and a severe burn is the result.

Moist Heat.—This is the form of heat which is applied by means of warm baths, fomentation, and poultices. Bathing with warm water is an extremely useful and soothing method of applying heat. The inflamed or injured part, if it admits, may either be placed in the water, and allowed to remain there for some time, more hot water being added occasionally to keep up the temperature, or the hot water may be poured upon the part, or allowed gently to run over it. Pouring warm water from some little height, and allowing it to fall in a stream upon the surface, is useful in treating chronic affections of joints. Warm baths, in which either the entire body or portions only are immersed, are also of great service in treating surgical and other diseases or injuries. In painful or irritable affections of the urethra, bladder, and rectum, there is no more soothing remedy than immersing the buttocks, perinæum, and lower part of the abdomen in hot water. If the ordinary hip-bath is not at hand, a pail or tub filled with hot water answers very well for this purpose. The temperature of the water employed should be regulated according to the patient's feelings. The bath is more efficacious as a rule if the water is hot, and the patient remains only a short time (from five to ten minutes) in it.

Fomentations.—A fomentation consists of a piece of flannel or other thick material soaked in hot water, wrung out, and then applied to the surface. It is usual to change the flannel or cloth every few minutes or hours, as the case may be, steeping it in fresh hot water, and then re-applying it to the part. A very useful material for fomentation is the spongio-piline, which is made of sponge, with some waterproof substance on one side. This material retains heat and moisture admirably. If the fomentation is not required to be of large size, as in treating affections of the hands or feet, a double fold of lint, soaked in hot water, and then covered by gutta-percha or oilskin, answers very well. If the fomentation requires to be applied very hot, it is best to place the fomentation flannel or cloth in a towel, after having soaked it in the water, and then squeeze or wring it; for the heat is usually too strong for the nurse or assistant's hands if the fomentation cloth itself be laid hold of. It is useful in some cases to add poppy heads or laudanum to the water in which the fomentation cloth is soaked. Should counter-irritation as well as heat be desired, a little turpentine may be sprinkled on the fomentation cloth before it is applied.

Poultices.—Linseed meal, barleymeal, and oatmeal are the substances usually employed in hospitals to make poultices. Bread or bran may also be used for the purpose. Charcoal, chloride of lime, or other disinfectants are often usefully combined with linseed meal or other poultices in treating cases of mortification or wounds which have an offensive smell. Some preparation of opium or belladonna may occasionally be added to a poultice in order to increase its local sedative effect. If slight counter-irritation be desired, a little powdered mustard may be sprinkled over the surface of the poultice before it is applied. Of whatever material the poultice is made, it requires either to be spread on a piece of linen or other rag, or placed between two folds of the same. In the former case, the poultice is applied immediately to the surface; in the latter, the substance of the poultice does not come in direct contact with it. The former method is that which is usually adopted in treating wounds or sores, and it is in most cases advisable to spread a little simple ointment, fresh butter, or oil over the surface of the poultice, to prevent its particles adhering to the wound or sore. The latter method is generally used in treating swellings or inflammations where the skin is not broken. A popular way of applying a poultice in this way is to put the substance of which it is composed into a bag or stocking, and then lay it on the affected part.

For the sake of illustration, the manner of making and applying a linseed poultice may now be described. The materials required are a large or small basin, according to the size of the poultice to be made, a strong spoon or flat piece of wood, some linseed meal, a kettle or pan of boiling water, and a piece of linen or other cloth of the requisite size. The linseed meal should be placed in the basin, the hot water (which should be boiling) gradually poured on it, and the whole stirred up until it has formed a mass of the consistence of thick porridge. This mass is then to be smoothly spread to the depth of from half an inch to an inch upon the linen cloth to the extent required, the edges of the cloth neatly turned over at the margins, and the surface of the poultice greased. The poultice is now ready to be applied, and should be gently placed upon the affected part, and secured there either by means of a handkerchief, bandage, or strips of sticking plaister. When oatmeal is used to make the poultice, it is better to boil it. If there is likely to be much discharge from the wound or sore to which the poultice is applied, it is a good plan to place over the poultice, before securing it, an additional fold of rag, or a little cotton wadding, in order to prevent the linen or bedclothes from being soiled. Poultices should be removed at least two or three times a-day; in some cases, every two or three hours will not be too often, and fresh ones applied. If it be advisable that the poultice should retain its warmth and moisture for some time, a piece of oil-skin or gutta-percha may be placed over it. Poultices should always be removed with care and gentleness, as they not unfrequently become dry at some portion, and adhere either to the sore or the cutaneous hairs.

Inhalation.—Another method of applying heat, employed in affections of the throat and air passages, is the inhalation of heated vapour, medicated or otherwise. Apparatus have been made for this purpose; but holding the face over a jug, or other receptacle containing either hot water alone, or water medicated, and allowing the vapour arising from it to enter the mouth and nostrils, is a very efficient form of inhalation, especially if some light handkerchief or cloth be laid over the head and receptacle containing the hot water, in order to prevent the escape of the vapour as much as possible. In a case of severe throat affection I lately saw, great relief was obtained by holding the face over a large pail containing an ordinary bran mash made very hot.

Application of Cold.—Cold may be used to stay bleeding or to relieve inflammatory symptoms by exposing the part to the air, and applying lint or other cloth dipped in cold water, which should be constantly changed, or by allowing cold water to drop continuously from a little height on to the wound or inflamed part by means of a syphon or piece of worsted. The most efficient method of using cold is by means of ice. Ice is best applied to the surface of the body by confining it in a fresh bladder. The ice should be broken into fragments about the size of a walnut, introduced into the bladder, and then a string tied round its neck, so as to prevent the escape of any fluid. The bladder should not be filled with the ice: about three-quarters full is sufficient, for it then adapts itself more readily to the surface on which it is placed.

DRESSINGS.

The dressings now used in surgical practice are of the simplest nature, and recent experience has shown that many wounds may be treated with the best results without the application of any dressing at all, the part being merely kept clean and at rest.

Dressings may be divided, for the sake of description, into **dry, moist,** and **greasy.** In using any of these dressings, it is of consequence that the parts to which they are applied should be handled with great gentleness. Dressings should always be placed on a wound or sore, and removed from it, with care; for any roughness, besides causing pain, may very easily tear open a wound or loosen adhesions. If the dressing should have become dry, and adhere to the wound or sore, a little warm water carefully dropped on it will generally soften the hardened portion, and allow it to come away readily. In removing dressings from wounds which contain ligatures or sutures, it should be seen that the dressing is not sticking to them. If necessary, the ends of the stitches or ligatures may be cut across, and removed along with the dressing. In the treatment of all wounds, but especially of those which are connected with a cavity or cavities, it is of the greatest importance to apply dressings in such a way that the discharges will have a ready exit, for if these discharges be allowed to accumulate, they retard the healing process, and give rise to local irritation.

Dry-Dressing.—This kind of dressing is usually employed when union of a wound by first intention is desired. It is also useful in treating healthy sores when it is wished to diminish or limit the amount of healthy discharge. Dry lint, caddis, or soft linen rag, is generally used for this dressing. The most convenient form of employing these is in the following manner:—If lint or linen be used, cut two pieces a little longer than the wound to which they are to be applied, and about an inch or two inches in width; cut also a third piece of the same length, but wide enough to cover over the wound and other two pieces. The two first pieces are to be applied, one to each side of the wound, but not encroaching upon it, as shown in fig. 1. The third piece should then be placed over both the wound and the two other pieces, and the whole secured in position by means of a bandage, handkerchief, or strips of plaister. Before applying this dressing, it should be seen that the edges of the wound are nicely in contact. The advantage of this dressing is, that the portions placed late-

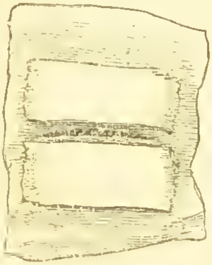

Fig. 1.

rally exercise a certain amount of steady pressure on the sides of the wound, which tends to keep them together, and, in additon, they prevent the third portion, which is applied over them, from coming in close contact with the surface of the sore, and hindering the free escape of serum, blood, or other discharge. When caddis is used, it should either be placed around the wound, on the same principle as the lint, or should be lightly laid over it, so as to absorb the serum or other discharge.

It is sometimes advantageous to get a wound to scab over, in order that it may close quickly, without suppuration taking place. In compound fractures and wounds of joints, it is often an object of importance to close the external wound immediately in this way; in the one case, that we may convert the compound fracture into a simple one; and, in the other, that we may prevent the serious results which are so apt to follow wounds of articulations. The best method to obtain the scabbing of such a wound is to dip a piece of lint or linen in the blood which is coming from it, and then to apply this as a dressing; the result in favourable cases being that, when the blood dries, the dressing adheres, and forms a sort of artificial scab, which should be allowed to remain as long as no irritation is excited by it. Another method, especially useful in wounds of joints, and in some superficial wounds of the face or other parts of the body, is to apply collodion, which forms a skin or glaze over the surface of the wound, and permits the healing process to go on underneath without irritation. The collodion is usually painted over the surface of the wound by means of a camel-hair brush, but it may also be applied by dipping a piece of lint in it, and placing it over the wound. The wound should always be well dried before the collodion is applied to it, and, if possible, all bleeding should have ceased.

A fine kind of skin-plaister applied over a superficial wound has very much the same effect as the collodion.

Dry-dressing may be allowed to remain in connection with a wound or sore for several days without being interfered with, provided the wound shows no symptoms of inflammation or irritation. If these symptoms appear, the dry-dressing should be removed at once, and water-dressing employed in its stead.

Wet-Dressing. — This dressing is generally used in the form of lint or soft linen cloth, damped with water, and placed on a wound or sore, a piece of oil-silk or gutta-percha being laid over it so as to retain the moisture. This constitutes what is usually termed "water-dressing." In applying water-dressing to sores, their entire surface, and some distance round their margins, may be covered by the lint, or the lint may be cut of the same size and shape as the sore, and placed accurately on it. The latter mode is preferable when the sore and its margins are in a healthy condition. In all cases the oil-silk or gutta-percha should be slightly larger than the lint, so as to overlap it on all sides; for, unless this is attended to, the dressing becomes dry and irritating. In some patients, water-dressing irritates the skin, and brings out little pimples. In such cases dry or greasy dressing may be substituted for it. Water-dressing may be secured in position by means of a bandage, handkerchief, or sticking-plaister.

Another excellent method of employing water-dressing in the treatment of large wounds or sores is to apply the moist lint or linen in the form of long strips. These may be applied across a wound or round a limb, so as not only to draw the edges of the wound together, but also to exercise a gentle pressure upon the affected parts. Strips of wet lint or linen applied in this way can often be usefully substituted for sticking-plaister, as they are in most cases much less irritating.

The various kinds of lotions which are applied to sores or unhealthy surfaces are used in the same way as water-dressing, the lint or linen being damped with the lotion instead of water. The following are some of the lotions commonly employed in surgical practice :—

Disinfectant Lotions.—These are used to counteract offensive smells from wounds or sores. A very effective disinfectant lotion is made by diluting Condy's fluid with water. Another disinfectant lotion is the

Lotio Sodæ Clorinatæ.

℞	Liq. calcis chlorinatæ, .	ʒss.
	Aquæ, . . .	℥i.

Ft. lt.

Stimulating Lotions. — These are employed to stimulate sores and induce healthy action. The most common forms of stimulating lotions are solutions of sulphate of zinc and copper. From two to five grains of either of these salts, dissolved in one ounce of water, makes an excellent lotion. Sulphate of zinc may also be used in the form of

Red Lotion.

℞	Zinci sulphatis, .	gr. iiss.
	Spts. lavandulæ, comp.	m. x.
	Aquæ, . . .	℥i.

F t. lt.

A solution of sulphate of copper in water forms what is usually called

Blue Lotion.

℞	Cupri sulphatis, .	gr. iij.
	Aquæ, . .	℥i.

Ft. lt.

A strong solution of this salt is sometimes also employed as a caustic or powerful stimulant.

Cooling and Sedative Lotions.—These are used to allay excited action in a part, and to soothe and relieve pain or uneasiness. The best lotions for this purpose are solutions containing sugar of lead with or without the addition of opium :—

Lotio Plumbi diacet., or Goulard's Lotion.

℞	Liq. plumbi diacetat .	m ivss.
	Aquæ distillatæ .	℥i.

Ft. lt.

Plumbi lotio et Opii.

℞	Pulv. opii . .	gr. iss.
	Plumbi acet. . .	gr. iij.
	Aquæ bullientis . .	℥i.

Ft. lt.

This latter lotion may be applied warm, or may be allowed to cool first. In applying this lotion to broken surfaces, care must be exercised, as the opium may be absorbed, and act upon the general system.

A good cooling and evaporating lotion is the following :—

℞	Ammonia muriatis .	℈ii.
	Acid acet. dil. . .	℥ss.
	Spts. vini rect. . .	℥ss.
	Aquæ . . .	℥viii.

There is a lotion which is principally used as an application to venereal sores or chancres, and to certain ulcers. This lotion is called "Black Wash," or

Lotio Nigrum.

℞	Calomelanos, . .	gr. viii.
	Aquæ calcis, . .	℥i.

Ft. lt.

Solutions of nitrate of silver (from one to ten grains to one ounce of distilled water) are employed as lotions or applications to sores, and also to mucous or cutaneous surfaces, to stimulate them or relieve excessive irritation. When any of these lotions are used, like water-dressing, the piece of lint or linen in which they are soaked should be cut to the exact size of the sore, and then covered by the oil-silk or gutta-percha. When cooling or sedative lotions are applied to an unbroken surface, it is best to use them in the form of a warm or cold fomentation.

Greasy Dressings.—This kind of dressing is found to be useful in treating some superficial or other sores. It is usually applied to the skin after a blister has been removed, or after a superficial burn, and is a very convenient dressing in such cases. In some patients this kind of dressing appears to agree with their sores better than wet or dry lint. The usual way of applying this dressing is to spread the ointment or grease upon a piece of lint or thin rag, and then lay it on the sore. If the sore is healthy, fresh butter, lard, or any simple ointment, may be used. Other kinds of ointment, of a stimulating nature, are employed either to stimulate sores or keep up irritation, and promote discharge from them, this latter proceeding being one form of using counter-irritation.

Strapping.—The application of adhesive plaister to keep the edges of wounds together has been very much superseded by the employment of wire sutures, which cause so little irritation, that they may be allowed in most instances to remain in the wound until it has healed, or nearly so. Strapping, however, may still, in some cases, be usefully employed in the treatment of wounds, or to exercise pressure upon swollen textures or organs. Dressings, splints, or other appliances, may also be kept in position by means of strips of plaister. There are several varieties of adhesive plaister; but the common sticking-plaister or emplastrum resinæ answers best for all ordinary dressing purposes. If the resin plaister be too irritating, soap plaister may be used instead. When plaister is applied to a wound or sore to retain its edges in contact, it should be cut into strips, the breadth and length of which must depend upon the size of the wound or sore, and then these should be placed over the wound so as to cross one another. When strips of plaister are applied in this way, they adhere better to the surface, as one strip by crossing over another tends to keep it in position. Fig. 2 illustrates the simplest way of applying plaister so as to keep the edges of a wound together. If it can be avoided, the entire surface of a wound should not be covered with the plaister, as discharges may be prevented from escaping. In applying plaister to the lips, as after the operation for harelip, the strips should reach from the centre of one cheek to a similar point in the other, in order that they may have a good hold. It is also useful to place a small strip across the extremities of the plaisters, where they terminate on each cheek. This makes the strips which pass across the lips more secure, and prevents them being so readily loosened by the movement of the parts.

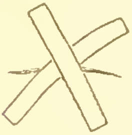

Fig. 2.

Great care should be taken in removing plaister from wounds, for, if one end of the strip be laid hold of and drawn roughly away, it may very easily open out a wound, or destroy its adhesions. The best plan to remove strips of plaister is to draw first one end from the skin and then the other, leaving the portion in connection with the surface of the wound to be separated last. In some cases, bathing the plaister with warm water allows it to come away more easily. The substance of which the plaister is composed often adheres to the skin, and cannot be washed off. A little oil rubbed over it will generally take it away completely. It sometimes happens that plaister irritates the skin very much, and, if its use cannot be avoided, a piece of lint or soft linen may be placed between the plaister and the skin.

Strapping is used to cause absorption of the callous or thickened margins in old-standing ulcers of the legs or other parts. If the ulcer involves a considerable portion of the circumference of a limb, it is better to apply the strips of plaister all round the limb, so as to cover the entire sore and its margins. The strips of plaister used for this purpose should be from an inch to an inch and a-half in width, and sufficiently long to pass round the limb. Before applying the plaister, it is advisable to apply a bandage from the base of the toes up to the part to be strapped; for if this is not done, the strips of plaister act more or less as temporary ligatures, and cause congestion of the parts below.

The method of strapping a limb is illustrated by fig. 3, and may thus be described. Take hold of one end of a strip of plaister between the finger and thumb of one hand, the other end being held in a similar way by the opposite hand, and pass it behind the limb an inch or so below the margin of the sore, then bring the two ends of the plaister in front, and apply them so that they will cross one another over the surface of the sore. Each strip is to be applied upwards in this way, the upper one slightly overlapping the under one, until the entire sore and its margins are covered. The bandage should now be continued over the plaister, and up the limb as far as may be necessary. Plaister, when employed in this way, does not usually require to be changed before the third day. In removing it, a pair of scissors should be carefully introduced underneath the plaister at some point away from the ulcer, and the whole slit up, so that the entire strapping may be taken away together.

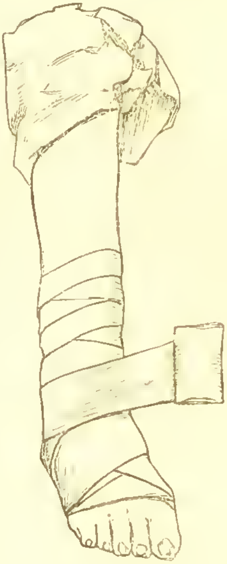

Fig. 3.

Strapping is also sometimes used to exercise pressure on joints which are affected with chronic disease. 'Scott's dressing' is merely the application of mercurial ointment (spread on strips of lint) to the surfaces of a joint, strips of plaister being then carried round over it, so as to embrace the entire articulation. In strapping a joint, the plaister is to be applied in the same way as when encircling a limb, a bandage being first adjusted from below, upwards as far as the joint to be strapped. The whole articulation should be embraced by the strips of plaister, and then the bandage continued over it. It is very useful to associate with the strapping of joints pasteboard splints, such as are shown in fig. 53. The method of strapping the knee-joint is shown at fig. 4, A.

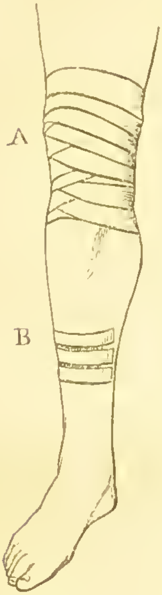

Fig. 4.

When strips of plaister are employed to keep poultices or dressings in position, they must be passed over or across them in the most convenient direction. At B, fig. 4, is shown the simplest way of applying strips of plaister to keep a small dressing on the leg.

An entire finger or toe may sometimes be advantageously strapped. The strips of plaister employed for the purpose should be narrow, and should be passed round the digit from its extremity to its base.

Plaister may be applied to the breast, either to support it or to exercise pressure upon it. The strips used for the purpose should be cut long, and about two inches in width, and then adjusted in the most convenient direction.

Strapping is frequently applied to the testicle when enlarged. The strips of plaister for strapping a testicle should be about half-an-inch in width, and six or eight inches long. Before applying them, the hair should be shaved off, and the testicle to be strapped drawn from its neighbour, and isolated as much as possible by tying a piece of soft bandage round the cord and upper part of the scrotum, on that side, as shown in fig. 5. The strips of

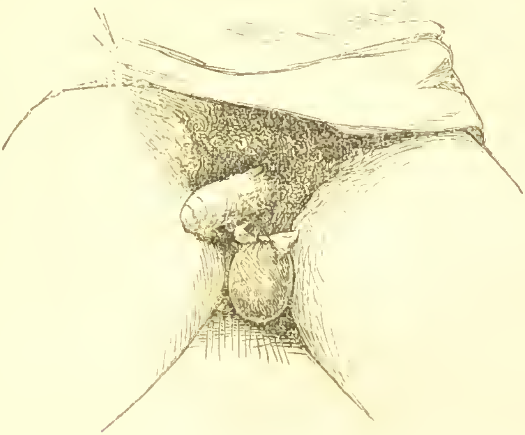

Fig. 5.

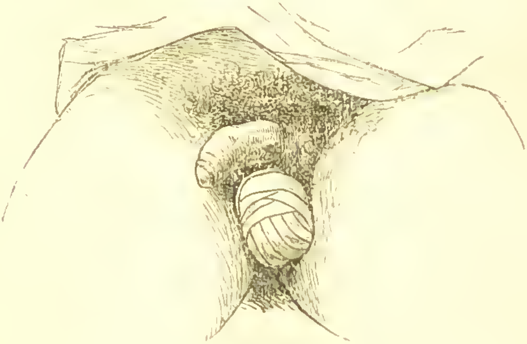

Fig. 6.

plaister should then be carried round the testicle in different directions, as shown in fig. 6, so as to exercise an equal pressure on all sides. When the whole testicle is covered, the bandage should be removed from the cord, and a suspensory or ordinary bandage applied, so as to support the parts. If an ordinary bandage be used, it will be necessary to make it take a turn or two round the abdomen as well as the testicle, so that it may have a proper hold.

In addition to the varieties of strapping already mentioned, medicated and adhesive plaisters are occasionally applied, either to support and strengthen a part, or to exercise some soothing effect upon it. What are termed "strengthening" plaisters are nothing more than adhesive and medicated substances spread on strong cloth or leather, and applied in the form of a broad strip or square.

BANDAGING.

Bandages are employed to keep dressings, splints, or other appliances in position, to prevent movement, or to exercise a steady and equable pressure upon a part. It is of consequence, therefore, that the proper application of a bandage to the different regions of the body should be understood by the house-surgeon and dresser. The surgical student should take every opportunity of practising the application of the different kinds of bandages, for it is only in this way that he can expect to obtain proper dexterity in bandaging.

Bandages are usually made of cotton, either bleached or unbleached, but they may also be made of linen, flannel, or other cloth. A very excellent kind of bandage (especially for private practice) is that which is called "cotton net" bandage. This bandage is soft and elastic, and is very useful and efficacious in treating swelling of the limbs, arising from varicose veins or other causes.

Several varieties of bandages are described, but the simple roller is the essential one, as the others can readily be manufactured from it. The other forms of bandage, which may be noticed, are the "double-headed," "many-tailed," "four-tailed," and "T."

The Single-Roller or Bandage (fig. 7) may be made of any length and width, according to the particular region to which it is to be applied. For most purposes, this bandage is best made about three inches wide, and from five to six yards long. It should be rolled up as firmly as possible, for it is then much more easily and neatly applied.

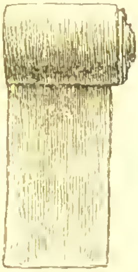

Fig. 7.

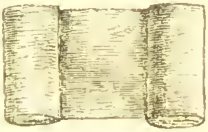

Fig. 8.

The Double-headed Roller (fig. 8) is rarely used, except in bandaging the head.

The Many-tailed Bandage (fig. 9) may either be made, as is shown in the illustration, by tearing a piece of linen or other cloth into strips on each side, a portion of the cloth being kept whole in the centre, or by tearing a common single roller into strips of equal length, and stitching them together along their centre.

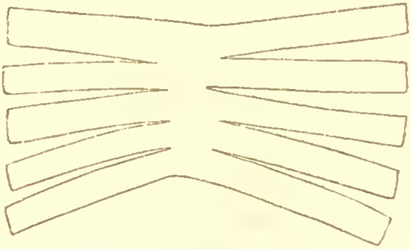

Fig. 9.

The Four-tailed Bandage is the same as the many-tailed, but has only two strips on each side.

The T Bandage is one made in the form of the letter T, and is used for keeping dressings or other appliances in connection with the perinæum or genital organs.

Another very useful appliance for retaining dressings in position is a triangular piece of linen or cotton; a common handkerchief, folded triangularly, answers as well. This is the appliance generally used as a "sling" to support the arm, as shown in fig. 10. In adjusting a sling to the arm, the apex of the triangle should be directed towards the elbow, the base towards the hand. The single roller may be applied in several ways; but the two most frequently used are (1st), that in which the bandage is passed round in a spiral form, with occasional reversions, in order that it may adapt itself more evenly to the surface; and (2nd), that in which it is applied in the form of a figure of eight. Another method is that in which portions of it are applied in loops.

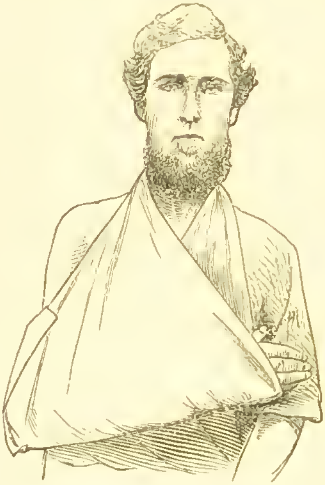

Fig. 10.

The many-tailed bandage is applied by allowing the limb to rest on its centre, and then, commencing from below, bringing the ends of each strip round in front, so as to cross one another, this process being continued until all the strips are adjusted. When loose strips of bandage are used, they must be passed round the limb in the same way as strapping.

The T bandage is applied by tying round the abdomen the cross portion, so that the perpendicular piece hangs behind, and then bringing the latter up between the thighs, and securing its end to the former in front.

Bandaging will, however, be best illustrated by considering the methods of its application to the different parts of the body.

Bandaging the Head.—The sling or handkerchief may often be usefully applied to the head, so as to retain dressings in position. The mode of applying the handkerchief is shown in fig. 11, and may be described thus:—Take hold of its lateral ends, one in each hand, and allow it to fall on the head, the apex of the triangle being directed so as to fall over the occiput, the base resting against the forehead; the ends of the handkerchief, held in the hands, are then to be carried round the occiput, one on either side, and brought again in front, so as to encircle the head

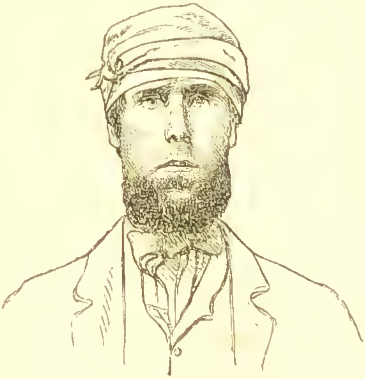

Fig. 11.

and meet over the forehead or temple, where they should be fastened or tied together.

In fig. 12 is illustrated the best method of encircling the head with an ordinary roller, when it is only necessary that the bandage should be applied to the temples, forehead, or occiput. This bandage is adjusted by passing a single roller a certain number of times round the head from the occiput to the forehead, making a few reversions at one temple or on the forehead, in order to allow it to adapt itself more smoothly to the parts.

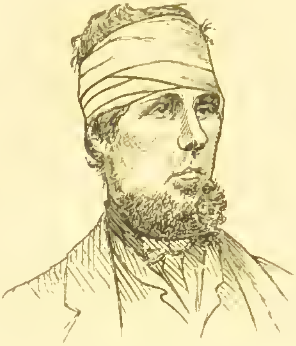

Fig. 12.

When it is desired to bandage the whole or part of the scalp, a single or double roller may be used. When a single roller is used, it should first be passed once round the head, a few inches of its extremity being left hanging, for the purpose of twisting the rest of the bandage round it, when making the different turns so as to cover the top of the scalp. The roller, having been made to take one turn round the head, should be twisted round the loose extremity, and then carried over the top of the head, as shown in fig. 13, down the temple, and brought under the chin up the opposite temple, and again turned round its loose end. This process must be continued until the whole scalp is covered, each turn being arranged so as to cover a portion of the scalp and overlap slightly its neighbour, and the result shown in fig. 14 obtained. In many cases it will be sufficient to carry the bandage only once or twice underneath the chin, in order to give it a hold, the other turns of the bandage being passed over the scalp alone.

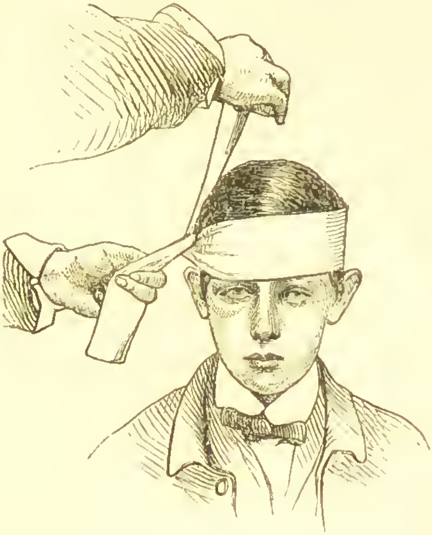

Fig. 13.

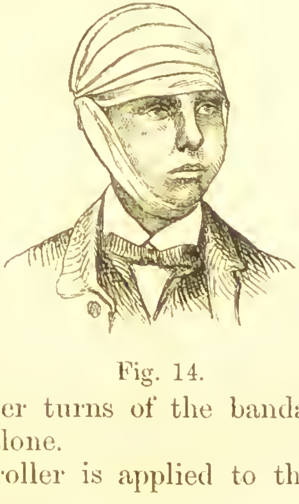

Fig. 14.

The double roller is applied to the scalp in much the same way as has just been described, only that each part of the roller should, in its turn, be carried round or over the head and underneath the chin, and twisted round its fellow when they meet. The double roller admits of being applied to any part of the scalp, and it has the advantage over the single roller, that the twisting need not be all in one place. Fig. 15 illustrates the method of using the double roller.

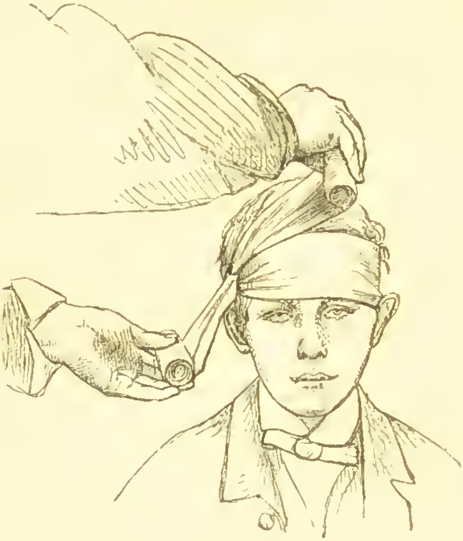

Fig. 15.

The four-tailed bandage may be applied to the scalp by placing its centre over the vault of the skull, and then carrying the two posterior tails down under the chin, and securing them there, the anterior tails being carried backwards and tied behind the occiput. The single roller may be applied to some portion of the face by passing it once or twice round or across it; but it is difficult to do this without closing up the eyes, mouth, or nose.

The chin frequently requires to be bandaged. One of the simplest methods of applying a bandage to the chin is the one represented in fig. 16. A portion of an ordinary roller, about a yard and a half or two yards long, should be taken, and a small slit made in the longitudinal direction about its centre. In adjusting the bandage, the slit ought to be arranged so that the prominent portion of the chin projects through it, and then the ends of the bandage should be carried back behind the occiput, crossed, brought round in front, and secured either on the forehead or temple.

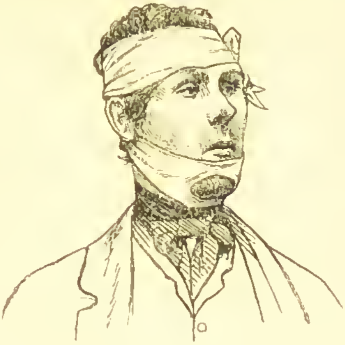

Fig. 16.

Another method of bandaging the chin, is by means of the four-tailed bandage. The centre of the bandage should be adjusted so as to embrace the prominence of the chin, and the ends then carried upwards, and secured, the posterior two over the top of the head, the anterior two being carried backwards below the occiput, and then brought round in front and tied over the forehead or temple. A third method is to take a portion of bandage, about a yard and a half long, and having passed its centre under the chin, bring the ends over the top of the head, and twist or tie them there, then carry these same ends backwards behind the occiput, and forward again to the part of the bandage which runs up the temples, and secure them to it, one on each side.

Bandaging the Shoulder and Upper Extremity.—

A bandage is best applied to the shoulder in the figure-of-eight form, as shown at A, fig. 17. This same bandage may be used to retain dressings or exercise pressure on the lower part of the neck or in the axilla. If more convenient, the bandage may be carried round the neck instead of passing it across the chest. Both shoulders may be bandaged by carrying a roller in the figure-of-eight form across the chest and over each shoulder alternately, as many times as may be necessary. This bandage may be used to draw back the shoulders or to support the breasts, the turns of the bandage being passed under the glands. Another method of keeping dressings or pads in the axilla, is by means of a sling or handkerchief carried under the axilla, its ends being tied over the opposite shoulder.

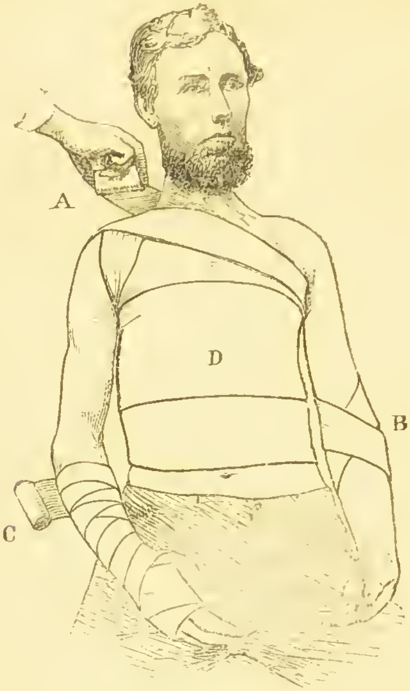

Fig. 17.

When the arm requires to be bandaged, it is in most cases advisable to commence by applying the roller to the hand and forearm. In doing this, the roller should first be made to take one or two turns round the hand and wrist, as shown at C, fig. 17, and then carried spirally round the forearm, reversions being made where necessary, until the elbow is reached. When this point is reached, it is better to make one or more figure-of-eight turns round it until it is covered, and then the bandage may be carried round and up the arm, reversions being made if required. The bandage having reached the shoulder, should be carried round the lower part of the neck or across the chest, and under the opposite axilla in a figure-of-eight form. This gives the bandage a good hold, and when it is necessary to adjust splints or dressings to the shoulder itself, the bandage should be made to take several turns in this way, until the appliance or dressing is firmly secured.

At B, fig. 17, is shown the figure-of-eight bandage applied to the elbow. This is the bandage used to retain the compress or dressing after venesection.

The hand and wrist are best bandaged by making a few turns in the figure-of-eight form round them.

When the fingers or thumb are to be bandaged, a narrow roller, about half-an-inch or an inch in width, is required. This bandage can be readily made by cutting an ordinary wound-up roller into two or more portions. In applying a bandage to a finger or thumb, one turn should first be made round its extremity, and then the roller carried round the finger, as shown in fig. 18, until its base is reached, when it should be passed once or twice round the hand and wrist, in order to give it a good hold. When the thumb is bandaged, the roller should be applied in the same way as far as its ball, and then a few figure-of-eight turns made round the wrist and its base, as illustrated in fig. 18.

Bandaging the Chest and Abdomen.—These regions may be bandaged with the ordinary roller; but it is, in most cases, more satisfactory to use a roller considerably broader (a bandage from six to eight inches in width is the most convenient).

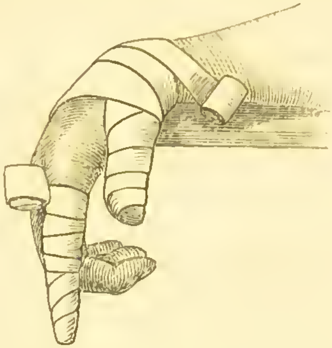

Fig. 18.

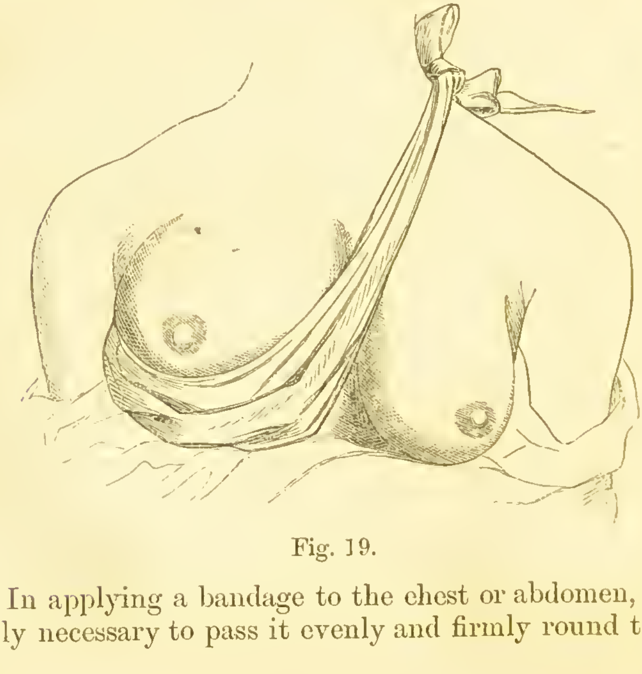

Fig. 19.

In applying a bandage to the chest or abdomen, it is only necessary to pass it evenly and firmly round these cavities, making a few reversions if required. The application of the broad bandage to the chest is shown at D, fig. 17. It is sometimes advisable to attach to this bandage another portion, which will pass round the neck or across the shoulders in the form of braces, to prevent the former slipping downwards.

The breast may be bandaged either by means of a roller passed round the chest, or by carrying turns of a bandage underneath the gland across the chest and over the opposite shoulder. A very good way of supporting the breast is by means of a sling or handkerchief adjusted as shown in fig. 19.

Bandaging the Groin and Perinæum.—Either one or both groins may require to be bandaged. In fig. 20, at A, the application of a broad roller to the right groin is shown. This is the form of bandage which is usually applied to keep a dressing or compress in position after the operation for strangulated hernia, and it

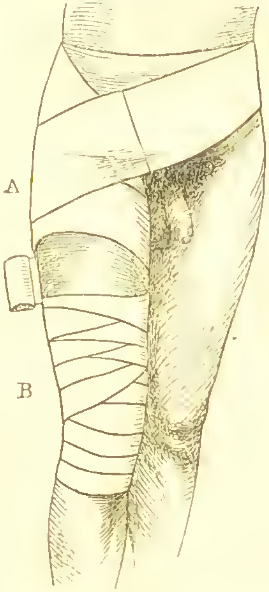

Fig. 20.

may also be used to adjust other dressings or appliances to the groin or upper part of the thigh. In securing the end of this bandage, it is advisable to introduce several pins, in order to keep its different turns in position.

When both groins require to be bandaged, the roller should be made to take one or two turns round the abdomen, and carried in a figure-of-eight manner round first one groin and upper part of the thigh, and then round the opposite side in the same way, as often as may be necessary, the whole being finished off by a few more turns round the abdomen, as illustrated in fig. 21.

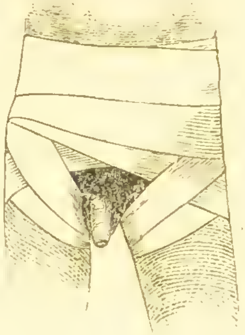

Fig. 21.

The perinæum may be bandaged by means of the T roller, the application of which has already been described, or by means of two handkerchiefs, one of which should be secured round the abdomen, and the other, having been fastened to the former behind, is to be brought up between the thighs, and fixed to it in front.

The scrotum and testicles may be slung by means of a suspensory bandage prepared for the purpose, or by passing the centre of a handkerchief underneath the scrotum, bringing its ends upwards, and securing them to another handkerchief or bandage fastened round the abdomen.

Bandaging the Lower Extremity.—The thigh is bandaged on the same principle as the arm, the roller being carried round the limb, and reversions made when necessary, as shown at B in fig. 20. If the whole thigh is bandaged, the roller, when it has reached the groin, should be made to take one or two turns round the abdomen, in order to fix it.

The knee-joint is best bandaged by passing the roller round it, in the figure-of-eight form, as many times as may be required. Dressings may also be kept on the knee by means of a four-tailed bandage, in the following manner:—Place the centre of the bandage over the anterior aspect of the joint, carry the tails backwards, the upper ones above the patella, the lower ones below it, and then, having crossed them behind the limb, bring them in front in the same situation, and tie each two together.

In bandaging the leg, the roller must first be made to take a turn round the foot and ankle in a figure-of-eight form, as shown in fig. 22; and then, commencing

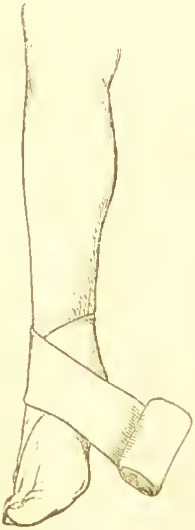

Fig. 22.

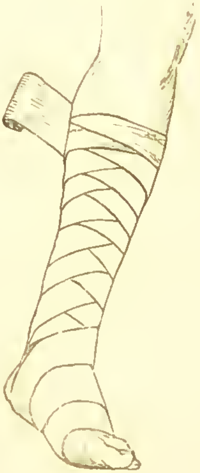

Fig. 23.

at the base of the toes, passed upwards round the whole foot, ankle, and leg, reversions being made when required, as illustrated in fig. 23.

The application of a many-tailed bandage to the leg is illustrated in fig. 24.

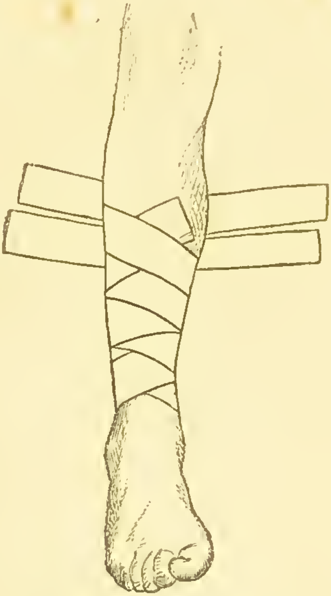

Fig. 24.

The toes are bandaged on the same principle as the fingers, a narrow roller being used, and fixed by a few turns round the foot and ankle if need be. It will sometimes be more convenient to make a turn or two round the foot and ankle before bandaging the toe itself.

Bandaging Stumps.—Dressings may be applied to a stump by means of a handkerchief or four-tailed bandage; but when it is necessary to exercise pressure, this can only be done properly by means of an adjusted roller. In amputations of the thigh, or other portion of a limb, where it is desirable to lessen the dragging on the flaps dependant upon the retraction of the muscles, the roller should be passed round the limb for some distance above the stump. In the majority of amputations now, it is only necessary to apply a bandage to the stump itself, as the method of operating by long and single flaps does away very much with the retraction of the muscular tissues. The method of bandaging a stump is shown at fig. 25, and may be taken as an illustration of the kind of bandaging which is useful in most stumps. An ordinary roller being made to take turns across the face of the stump until it is completely covered, should then be carried a few times round the base of the stump, so as to secure all the other turns, and keep them in position. In some cases it may be more convenient to make a few turns round the stump first, before making those which cross over its face.

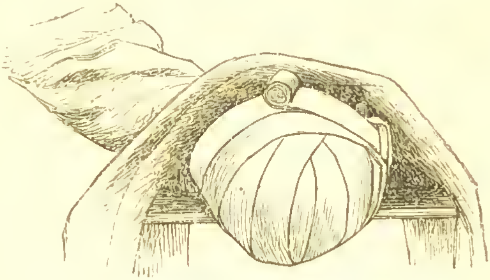

Fig. 25.

Application of Immoveable Bandages.—Plaster of Paris, starch, dextrine, glue, or other substances, are used to stiffen the rollers when applying this form of bandage. Bandages stiffened with any of these substances may be adjusted to a limb alone, or in conjunction with splints or other appliances.

The plaster of Paris has the advantage over the others that it dries quickly; but, owing to its weight, and the readiness with which it is cracked, it is best used only in cases where the limb is kept perfectly and constantly at rest.

Starch bandages take longer to dry, but, when well dried, the patient can move freely about without injuring them.

When a plaster of Paris bandage is to be adjusted to a limb, a dry roller should first be passed round it, so as to protect the skin, or a little cotton wadding may be used for the same purpose, and then a bandage, which ought to be coarse in its texture, having been rubbed with the plaster, in the form of dry powder, until its structure is infiltrated with it, should be damped in water, and applied round the limb in the ordinary way. Some plaster, mixed into a paste with water, should afterwards be smeared over the bandaged surface, so as to assist in making the parts as stiff as possible. Another method of using the plaster of Paris is to make a thin paste of it with water, and then, having damped a bandage, to unroll it and pass it through the paste, rolling it up again and then applying it to the limb with the same precautions as in the former method. When a plaster of Paris bandage has been applied, the limb should be kept in the proper position until the plaster has become hard. It has been recommended that flour paste or spirit varnish should be painted over the plaster when it has dried, in order to prevent it chipping, and to keep it clean. A plaster of Paris bandage is easily removed by unrolling it from the limb, and, if need be, chipping the plaster here and there.

A starch bandage is adjusted in the following manner:—First apply a dry roller round the limb to be bandaged, and then, with the hands or with a brush, rub over the surface of this bandage some starch which has been boiled, so as to form a thin jelly. Another bandage should then be adjusted on the top of the first one, and starch rubbed over it also, when the apparatus will be complete, and only requires to dry, which it usually does in from twenty-four to forty-eight hours. Splints of pasteboard are frequently combined with this bandage, and when they are used the starch should be freely rubbed on their surfaces before they are adjusted. A starch bandage is best removed by dividing it along its whole length, on the most convenient aspect of the limb, with a pair of strong scissors or the forceps made for the purpose. If neither of these instruments be at hand, a penknife may be used. The bandage may in this way be removed whole in the form of a case, which can be readily re-applied if advisable, and secured by a bandage.

The plaster of Paris or starch bandage will be found to answer all the requirements of an immoveable apparatus, and, therefore, it is quite unnecessary to describe in detail any of the others.

CHAPTER III.

APPLICATION OF COUNTER-IRRITANTS. CAUSTICS. SUTURES. LIGATURES.

DIFFERENT kinds of counter-irritants are used in surgical practice, according to the effects which they are wished to produce. Some of these act by causing only superficial irritation, while others give rise to inflammation, suppuration, or even destruction of more or less tissue.

The milder class of counter-irritants includes all applications of a stimulating nature, which, when brought in contact with the skin, produce only a certain amount of local congestion or superficial inflammation. These are usually termed rubefacients. The rubefacients commonly used are mustard applied in the form of a poultice, turpentine employed in the form of a liniment or fomentation, and croton oil or tartar emetic ointment. The two latter, when rubbed on the skin, produce numerous pustules.

Mustard Poultice.—A mustard poultice is made in exactly the same way as a linseed-meal one, only the water should not have a higher temperature than 90° or 100°. When made, the poultice is usually placed between two folds of muslin or thin rag, and then applied to the surface. The poultice should be allowed to remain in contact with the skin from a few minutes to half-an-hour, according to the effect which it produces. After it has been removed, the skin should be gently sponged with warm water, and then some cotton wadding, or a piece of soft rag smeared with grease, placed over the surface which has been acted upon.

Blisters.—This class of counter-irritants when applied to the skin cause vesication. Among this class is the common "fly" blister or "rising" blister, which is made of the Spanish fly or cantharides. Cantharides may be used either in the form of a paste spread upon leather or brown paper (the ordinary blister), or in the form of blistering fluid or tissue. The common blister, when applied, should be cut to the proper size, and secured in position by means of a bandage or strips of sticking-plaister. It is customary to place a fold of linen rag or a little cotton wadding over the blister, in order to absorb any of the serum which may exude from the vesications. Blisters should not, if possible, be placed on prominent parts of the body which are exposed to pressure, for they may give rise to much inconvenience in these situations. Blisters should be allowed to remain in contact with the skin until they have produced a proper vesicant effect. The time required for this varies in different people, but, as a rule, it requires from six to twelve hours for a common blister to act efficiently. If at the end of this time the blister has not acted properly, it may be re-applied, or, what is often better, a hot poultice may be placed over the part, and will usually complete the vesication. When vesication has been produced, the vesicles should be pricked, the serum let out, and some dry cotton wadding or greased rag applied. In some cases it is advisable to prevent the sore healing, and to produce suppuration, so as to increase or keep up irritation. For this purpose the sore should be dressed with some sabine or resin ointment, spread upon lint or linen. In certain cases a more effective continuous irritation is produced by applying a succession of blisters. When blistering fluid is employed to cause vesication, it should be painted over the surface to be acted upon, or a piece of linen dipped in it may be laid on the skin. Blistering fluid or tissue usually acts much more quickly than the common blister.

Blisters sometimes produce considerable irritation of the bladder and kidneys, which usually comes on a few hours after their application. In such cases there is a frequent desire to pass water, and in severe cases blood may be present in the urine. The proper treatment for these symptoms is to remove the blister, wash away any portions of it which may have adhered to the skin, and administer ten grains of bicarbonate of potash and fifteen minims of tincture of hyoscyamus every hour or two until the patient is relieved.

In addition to the blister, we have a useful vesicant in the cautery of Dr Corrigan, or in the application of the nitrate of silver. The latter may be also employed as a gentler counter-irritant; but then requires to be lightly rubbed on the surface or applied in solution.

When it is desirous to obtain a speedy sedative effect on the system, some sedative drug in the form of powder may be applied to the raw surface caused by a blister; but the subcutaneous method of injecting sedatives introduced by Dr Wood has almost entirely superseded this proceeding.

The severer kinds of counter-irritation are produced by means of setons, issues, and the actual cautery.

Setons.—These are used to produce an effect either upon a local part or upon the whole system. They act by keeping up local irritation, and by causing a constant discharge of pus. When employed to act upon a local region, they may be introduced somewhere near or over that region; but when they are required to act upon the general system, they are usually passed through the nape of the neck.

There are needles and tapes made of pliable material for the purpose of introducing setons; but if these are not at hand, a common bistoury and probe, with an eye in its head, and some wick cotton, answer quite well. In passing a seton, the portion of skin through which it is to be introduced should be pinched up with the finger and thumb of the left hand, the needle or bistoury run rapidly through it, and the tape or cotton, having been connected to the head of the needle or probe, drawn through and secured. The wound should be kept clean, and dressed once or twice a-day, and the tape or cotton gently moved in it every two or three days. If the simple tape or cotton be not sufficiently irritating, some stimulating ointment should be smeared on it.

Issues.—An issue is a sore produced to act as a counter-irritant usually in some deep-seated complaint. This sore is best made by means of caustic potass, or the potassa cum calce. The caustic may either be rubbed into the skin until it has destroyed it for some depth, or a small portion of it may be placed on the skin, and secured there until it has acted upon it in the same way. It is often necessary to keep the sore open for some time in order to produce the requisite amount of irritation. For this purpose, two or three peas or other small foreign bodies ought to be introduced into the wound, and allowed to remain there until it is desirable that the sore should heal. The sore should be kept clean and dressed as often as may be necessary.

Actual Cautery.—This is one of the most powerful counter-irritants, and is principally now used in the treatment of certain diseases of the joints. It may also be employed to stay bleeding, or to destroy diseased surfaces or growths. Cauteries are made of steel or iron, and are variously shaped. For ordinary purposes, a cautery, consisting of a rounded knob fitted to the extremity of a long and rounded blade, and furnished with a handle, is sufficient. Corrigan's (or, as it is sometimes called, the "button") cautery is useful for producing a milder kind of counter-irritation. If cauteries be not at hand, a poker or any piece of metal heated to the proper temperature, will answer very well. The actual cautery, to produce its full effect, should be heated to as high a temperature as possible, and then applied immediately. It is usual to apply the cautery in lines along the skin, these lines running to the extent necessary for effecting the object required. In applying the cautery over a joint, it is best to make one line an inch or more in width on each of its lateral aspects. The cautery should be passed once or twice along the lines until the whole thickness of the skin is apparently destroyed. After the application, a large poultice should be placed over the burnt surfaces, and renewed as often as may be necessary. When the sloughs have separated, water or greasy dressing should be substituted for the poultice. When the cautery is used to stay bleeding, or to act upon diseased surfaces, it must be placed in immediate contact with the part, and freely used until the bleeding is stayed, or the desired effect produced.

Corrigan's cautery is best used by heating it over a spirit lamp, or by placing it in hot water, and then quickly tapping the skin with it over the extent of surface which is desired to be acted upon.

A portion of iron wire or a steel bougie made red hot, and introduced into fistulous openings or sinuses, is often usefully employed to excite them to heal or contract.

Acu-puncture.—This is generally classed among the counter-irritants. It consists in introducing needles into the tissues, and allowing them to remain there for a certain time. Acu-puncture is most frequently employed in painful nervous affections, especially in sciatica. The needles used for this operation should be about three inches long, sharp at the point, and fixed to some handle. In using them, they should be oiled, introduced over the painful part, and pushed with a slight rotatory movement down to the hilt, or until bone or other obstruction is encountered. It is usual, in cases of sciatica, to leave the needles in for two or three hours, and then to withdraw them. No dressing is required after this operation.

Hypodermic Injection of Sedatives.—This is a valuable and speedy method of producing a local sedative action, which we owe to Dr Alexander Wood, of this city. It is used in treating neuralgic and some other painful affections, with the most satisfactory results. From twenty to thirty minims of the ordinary solution of muriate of morphia may be injected, but Dr Wood informs me that he now generally uses for this purpose a solution of the muriate of morphia of four times the common strength, and injects only eight or ten minims. The instrument which Dr Wood employs is illustrated at figs. 26, 27, and consists of a small glass syringe, fig. 26, which is graduated so as to show the amount of fluid injected, and one or two fine hollow needles, fig. 27. The needles are also provided with a stillette for the purpose of keeping them clear. In performing the operation, the needle should be introduced into the subcutaneous tissue over the painful part, and the syringe having been previously adjusted to it, the proper amount of the sedative is readily injected. Before inserting the needle, care should be taken by gently depressing the piston to expel all air from the tube. The practice originally introduced for its *local* effect has since, as originally suggested by Dr Wood, been extended, and various medicines intended to affect the system *generally* are now introduced through the medium of the cellular tissue.

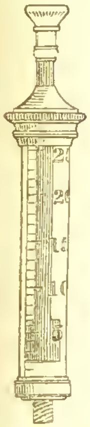
Fig. 26.

Fig. 27.

Caustics.—Caustics vary in their action according to their nature, and according to the manner in which they are applied. Caustics are employed to produce counter-irritation, to stimulate wounds or sores, and to destroy unhealthy surfaces and morbid growths. The milder forms of caustic commonly used are the nitrate of silver, popularly called caustic and sulphate of copper (blue stone). For the sake of convenience, these substances are best fastened into a quill or holder. These two caustics are generally employed to stimulate sores and to destroy warts or other superficial growths in connection with the skin or mucous membrane, and should be gently or firmly rubbed on the part according to the effect desired. If there is no moisture on the surface to which they are applied, this surface should first be slightly damped with water. Nitrate of silver is often usefully employed in superficial inflammations or irritations of the skin as a gentle counter-irritant. When it is applied lightly, it only blackens the skin, and leads to its subsequent desquamation. The blue stone is a very efficient application to sores, and also to venereal and other warts.

The stronger caustics in general use are potassa fusa, potassa cum calce, chloride of zinc, and nitric and sulphuric acids. The potassa fusa or potassa cum calce is used to make issues, and also sometimes to destroy superficial ulcerations of an unhealthy character. These caustics are employed in the form of rounded sticks, which should be rubbed freely on or into the part, the surrounding textures being protected. Chloride of zinc may also be used in the solid stick, but a very convenient method of applying it, so as to destroy superficial sores or growths, is in the form of a paste made with flour. This paste is made by rubbing flour and chloride of zinc together in a mortar until the mass has the consistence of thick glue or bird-lime. The paste having been spread on a piece of lint rather larger than the sore or growth, should be placed on the part to be acted upon, the surrounding tissues being protected by a fold or two of lint. The best way to protect the surrounding parts is to take a circular piece of doubled lint, and, having cut a hole in its centre large enough to receive the sore or growth, adjust it so that there will be a circle of lint all round the diseased surface, but not encroaching upon it. The paste usually requires to remain in contact with the surface for six or eight hours, after which time it ought to be removed, the parts washed, and a poultice or water-dressing applied until the slough separates. It is a good plan to administer an opiate to the patient before applying this or other caustic, which takes some time to produce its effect.

Nitric acid is the caustic employed to destroy warts, nævi, and other vascular tumours. It is also much used in cases of sloughing, phagedœna, or hospital gangrene, to stay the progress of the disease. When this acid is used to destroy warts, nævi, or other growths, it is only necessary to apply it to their surface by means of a glass rod or piece of wood, taking care to prevent the acid injuring the surrounding parts. In applying nitric acid to sloughing or ulcerating sores, it should be used very freely. The surface of the sore ought first to be well dried, and then the acid applied to its whole extent and margins. A poultice should be afterwards placed over the affected surface, and removed every few hours until the sloughs separate. If one application does not check the disease, the acid should again be used in the same way.

Sulphuric acid is one of the most powerful caustics, and is employed to destroy morbid growths, especially those of a malignant character. Tumours of large size may be completely killed by this caustic. The most convenient method of using this caustic is that proposed by Mr Syme; and having had considerable experience in this method, I can testify to its excellent results. Before applying this acid, it is very necessary to protect the surrounding parts from its action; and the best way to do this is to take a solution of gutta-percha in chloroform, and apply it in the form of a paste to the skin surrounding the tumour, taking care that it does not encroach upon the tumour itself. The paste should be spread in this way to the depth of about a quarter of an inch. A piece of sheet gutta-percha is then to be taken and made into a rounded tube, about two and a half inches in length, and sufficiently wide to receive the tumour. One end of this tube having been heated by means of a hot iron or hot water, should then be pressed down upon the circle of gutta-percha paste already applied to the skin, and held there until it adheres firmly. The surrounding parts are now thoroughly protected, and there is also a receptacle (in which the tumour lies) for containing the acid. Fig. 28 illustrates the application of the tube. Some strong sulphuric acid having been made into a thin paste by mixing it with sawdust or lamp-black, is then to be introduced into the tube so as to fill two-thirds of it. When the acid has been introduced, it is a good plan to take a circular piece of gutta-percha, and fit it to the end of the tube like a lid. This prevents any of the acid running out and staining the clothes or bed-linen. The acid should be allowed to remain in contact with the skin for eight or ten hours, and at the end of this time the whole apparatus must be removed, all the acid carefully washed off, and a large poultice applied. After the application of the caustic, the tumour will be found in the condition of a large slough, which becomes slowly separated from the surrounding parts, leaving a granulating sore of some depth, that must be treated in the usual way.

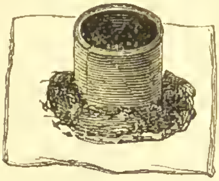
Fig. 28.

SUTURES.

There are four kinds of sutures used in surgical practice. These are the interrupted, twisted, quilled, and continuous. The two first are most frequently employed by the surgeon, the latter two being only applied in certain special cases. Before applying sutures to a wound, it should always be seen that its edges are properly in contact, and at the same time the best situation for introducing them may be determined. In introducing sutures, care must be taken to avoid injuring important vessels or nerves.

Interrupted Suture.—This is the suture which is in most common use. It may be made either of wire or silk, but within the last few years the former has come into almost general use, the latter being only employed in certain regions where the ends of the wire would be inconvenient. The best wire for the purpose is silver wire. A special needle, illustrated in plate 1, is required for its introduction. In threading this needle, the wire should be made to lie well in the grooves, so that there may be no catch when the suture is introduced. The needle, when properly threaded, is to be introduced through the skin about a quarter of an inch from one margin of the wound, and passed through the wound and opposite margin, so that it will come out at a point corresponding to its place of entrance on the other side of the wound. The wire is then to be drawn through, a single knot tied, its ends twisted once or twice round one another, and the wire nipped across with a pair of scissors close to the twist. In situations where a knot cannot be conveniently tied, it will be sufficient to twist the wire without tying it. The cut ends of the suture should not be left long, as they are apt to catch against dressings or other structures. In this way the requisite number of stitches should be introduced, as illustrated in fig. 29. Before tying the knot in this and other sutures, it should be seen that there is no turning in of the skin at the edges of the wound. The great advantage of wire sutures is that they may be allowed to remain in the tissues for any length of time, provided there is no great tension upon the edges of the wound.

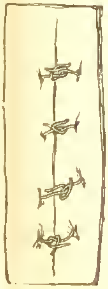

Fig. 29.

In removing wire sutures, one point of a pair of scissors should be carefully inserted close to the skin, beneath the loop of the wire, and the wire cut across. The upper end of the divided loop should then be laid hold of with the fingers, or with a pair of forceps, and the suture carefully drawn out in the direction corresponding to the curve which it has assumed.

The interrupted suture, when made of silk, is to be introduced in the same manner as the wire, by means of such a curved needle as is illustrated in plate 1. The silk, after its introduction, must be tied twice, as shown in fig. 30. In operations on the eye, where fine stitches require to be used, black silk is sometimes employed, as it is more easily seen than white. Silk sutures, as a rule, require to be removed about the third or fourth day after their introduction, for they soon ulcerate through the tissues, if not taken out at this time.

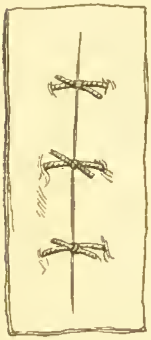
Fig. 30.

Twisted Sutures.—This is the kind of suture which is used to bring the edges of a wound accurately and closely in contact, as in operations or wounds in connection with the lips or other part of the face. The wire sutures have somewhat superseded the twisted suture, for in most cases of harelip it will be found that an excellent result can be obtained when the silver wire sutures alone are employed. For the introduction of the twisted suture one or more straight needles or pins, some silk or thread, and a pair of strong scissors or wire cutters, are required. If proper suture needles cannot be obtained, common straight sewing needles, with a drop of sealing wax on their head, answer very well.

The needle or pin should be introduced from a quarter to half-an-inch from one margin of the wound, and passed down so as to transfix the wound and come out through the opposite margin, at a point corresponding to that of its entrance. As many needles or pins as may be required to bring the edges of the wound together should be introduced, and then some silk or thread twisted round them in a figure-of-eight form, as shown in fig. 31, and secured by a knot. The lowest suture in the illustration shows the application of a fine pin, a proceeding which is often very useful in bringing the superficial part of the edges of a wound together. In employing this suture, it is usually only necessary to twist one turn of the silk round the pin. The ends of the needles or pins ought then to be snipped off, about a quarter of an inch being left on each side beyond the twisted thread.

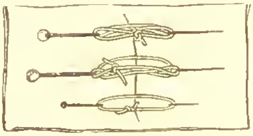
Fig. 31.

The needles or pins usually require to be taken out on the third, fourth, or fifth day, for, if allowed to remain longer, their pressure is apt to cause ulceration. When removing the needles or pins, their head should be laid hold of and carefully drawn out, the silk or thread not being interfered with. If the needle does not come away easily, a little careful rotatory movement of it will generally loosen it. In deep wounds it is sometimes advisable to introduce the needles to a considerable depth, so as to bring the deeper parts of the wound together, and in such cases a few small pins, or wire sutures, may advantageously be used to draw together its superficial portions.

Quilled Suture.—This kind of suture is usually employed to bring the edges of a lacerated female perinæum together. For the application of this suture, a strong curved needle fixed on a handle, some silk or thread, and two pieces of gum-elastic catheter, or other similar body, as long as the wound, are necessary. The needle being threaded, should be introduced about half an inch or an inch from one edge of the wound, passed deeply through the wound, and brought out at a corresponding point on its other side. The needle is then to be withdrawn, leaving the loop of thread behind; in this loop one of the pieces of gum-elastic catheter should be placed and adjusted so that it will lie parallel with the wound, and then the ends of the thread are to be drawn tight, and tied round the second piece of catheter, which should be adjusted to the opposite side of the wound. Two, three, or four loops must be passed in this way until the two pieces of catheter are firmly secured, as represented in fig. 32. When withdrawing this suture, the loops of thread should be cut, and then the whole can be readily drawn out.

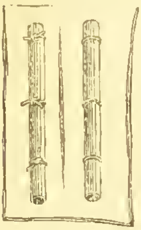
Fig. 32.

Continuous Suture.—This suture is principally used to bring together the edges of wounds in the intestines and eyelids. It is best introduced by means of a small curved needle, threaded with fine silk or thread. The thread having been knotted at one end, the needle and thread are to be carried through and through both edges of the wound, along its whole extent, the last stitch being secured by making a knot round the previous one. In removing this suture, the different stitches should be cut across, and the thread drawn out. When this suture is applied to the intestines, it is usual to leave the thread to work its way into the canal of the gut.

LIGATURES.

Ligatures are best made of strong and well-twisted silk, slightly waxed. They are sometimes applied round a portion of an entire artery, to diminish the flow of blood in the parts below; but, much more frequently, they require to be tied round a divided or wounded vessel. Ligatures are also used to produce the strangulation and death of tumours of a vascular nature.

When an uninjured portion of an artery is ligatured, it is first necessary to expose the sheath of the vessel at some convenient part, by careful dissection ; and then, having opened the sheath, to separate the vessel from it, but only to a sufficient extent to allow the aneurism needle and silk to be carried round the artery. The ligature, having been passed round the vessel, is to be tightly tied with a double knot, and its ends brought out through the wound. If such a ligature be carefully applied, and the artery be healthy, the result, in most cases, is very satisfactory.

A ligature may, in some instances, be applied round a wounded artery, by means of the aneurism needle, provided the vessel be not entirely divided ; the needle and silk being first passed above the wound, and then below it, so that a ligature may be tied round the artery on each side of the wound.

When an artery is divided or wounded in surgical operations or in injuries, its extremity or extremities require to be seized with a pair of artery or other for-

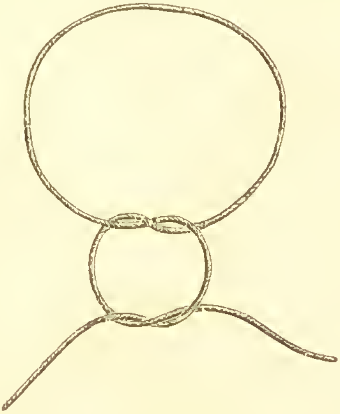

Fig. 33.

ceps, and a ligature applied round them. House-surgeons, dressers, and students are often called upon to ligature arteries in this way, and, therefore, it is of consequence that they should be able to do so with dexterity. In laying hold of an artery for this purpose, it should be seized alone, and isolated from surrounding textures before the ligature is applied. This, however, is not always possible, and is not of much consequence in the case of small arteries. The ligature is tied round the extremity of the vessel by means of the ordinary reef-knot, illustrated at fig. 33. This knot may be tied in several ways; but the house-surgeon or dresser should endeavour, by practice, to do it in a neat and dexterous manner.

The best method of tying an artery is to lay hold of

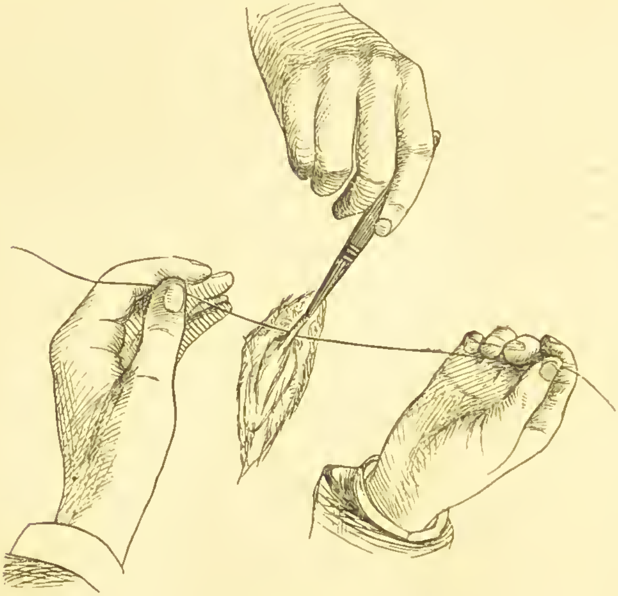

Fig. 34.

the ligature, and carry it behind the forceps and artery, as shown at fig. 34. The left hand, still holding one end of the ligature, is then to be carried behind, over, and across the right hand, which holds the other end, so as to bring the left thread across the right one, and place it in the space between the middle and ring fingers, where it should be held by these two fingers.

The left hand, being now at liberty, should seize the extremity of the ligature, which is held between the finger and thumb of the right hand, and draw it away from this hand, the middle and ring fingers of the right hand being at the same time drawn in an opposite direction, along with the thread held between them. It will now be found that one knot is formed, and, in order to apply this knot accurately to the artery, the points of the forefingers should be passed down along each thread close to the knot, as shown in fig. 35, while it is being tightened. In doing this, care must be taken to tighten the knot on the vessel, and not on the points of the forceps. A second knot should be tied in the same way, except that the right hand, with the thread which it holds, should be crossed over the left one, and then the other steps of the proceeding performed as in tying the first ligature. Both knots may be tied without changing the hands, but then a "granny" knot is the result. This latter method, although it does not form a true reef-knot,

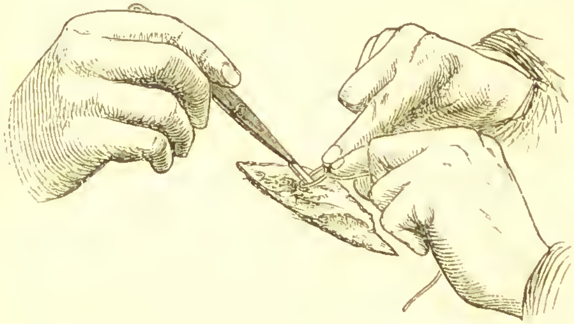

Fig. 35.

appears to be sufficiently secure, as it is constantly used in practice with a good result. The first knot should always be tied carefully and firmly on the artery, so as to insure its proper action on the coats of the vessel. Both ends of the ligature should be left, and brought out at the external wound. If a wound be stitched after the application of ligatures to arteries in it, care must be taken to bring the ends of all the ligatures out externally. Wounded veins may be tied in the same way as arteries, when the bleeding from them cannot be stayed by pressure or position.

Application of Ligatures to Tumours. — If the neck of a tumour be very narrow it will usually be sufficient to tie the ligature round its pedicle, but when the tumour has a broader attachment it is necessary to transfix its base in order to strangulate it in two or more portions. Sometimes a tumour may be strangulated by passing one or more needles through its base, and then tying the ligature round below these. The simplest method of strangulating internal hæmorrhoids or vascular tumours, is to transfix their base with a curved needle threaded with strong silk. By this means a loop of silk is drawn through, as shown in fig. 36, and the needle having been cut off from it, the threads A and A are to be tied together so as to strangulate one-half of the tumour, and then the threads B and B so as to strangulate the other half. The threads should always be tied firmly by means of two or more knots. A ligature may also be introduced subcutaneously round the base of a tumour, and

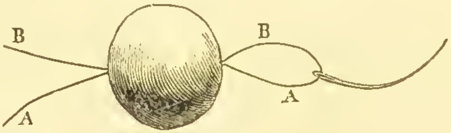

Fig. 36.

tied so as to strangulate the tumour without destroying the skin.

Ligatures may also be applied so as to strangulate tumours in four or more portions, but an account of these will be found in works on practical surgery. I would only refer to a method which may be employed when the tumour is of an elongated shape. This plan is illustrated in fig. 37, and consists in running a needle, armed with strong silk or thread, through and through the tumour, along its whole length, so as to leave a number of loops. These loops must be cut, and two ends of the thread tied together, so as to strangulate a portion of the length of the tumour. When all the threads are tied in the right way, the whole tumour will be strangulated. The threads A and A, C and C, B and B, D and D, E and E, F and F, G and G, H and H, being tied together, the proper result will be obtained.

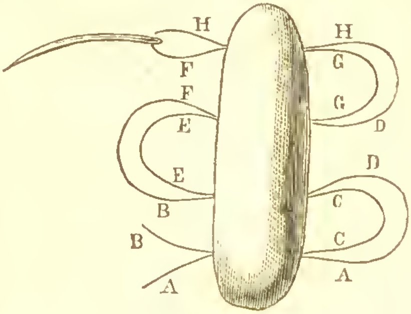

Fig. 37.

Acu-pressure.—This is a method of restraining hæmorrhage, which has lately been proposed by Professor Sir J. Y. Simpson, and consists in the introduction of needles to exercise pressure upon the vessels. Dr Simpson has suggested several ways of applying the needles for this purpose, a full account of which will be found in his book on "Acu-pressure." There can be no doubt that needles may be applied so as to compress arteries or veins; but, as far as experience yet goes, acu-pressure has not been found to possess any advantages over the ligature in general surgical practice. In cases where the ends of an artery have retracted, and cannot be secured by a ligature, a needle may be usefully introduced, so as to compress the artery and stay the bleeding ; but, except in certain special cases of this kind, the use of the ligature is, in my opinion, more convenient and secure in the treatment of surgical hæmorrhage.

CHAPTER IV.

INJURIES AND THEIR TREATMENT.

The house-surgeon, dresser, or surgical student may be called upon at any moment to treat a patient suffering from injury, the result either of accident or design. The injury may be severe or only trifling, but whichever it be, it is of great consequence that he should be able at once to recognise its nature and use the proper means of treatment. It is of more importance that he should be able to do this, for, as a rule, when a person suddenly sustains an injury, the people near him have little idea what to do, or are so excited by the occurrence that their interference is worse than useless. When a house-surgeon or dresser is sent for to visit a patient suffering from injury, he should lose no time in seeing the case, for he may be able to save the patient's life, or employ some treatment which will very much lessen the results of the accident. If the patient is at some distance from an hospital, it will be right for him to take any instruments or appliances which are likely to be required for the treatment of the injury, and for this reason the messenger should be briefly questioned as to the nature of the accident. In many instances it will be found very difficult to get an intelligble account of the case. The majority of severe injuries are best treated in hospitals or infirmaries, where there is every appliance which may be required; so that if the patient is not already in an hospital, he ought to be conveyed to one as soon as possible, and in a manner which will be least likely to aggravate his injury. In cases of fracture, if the surgeon has not proper splints with him, a piece of pasteboard, wood, or other simple appliance may be adjusted to the limb, so as to prevent the fragments of bone injuring the surrounding soft textures. If there should be a wound, and bleeding taking place from it, the hæmorrhage should be at once stayed by pressure, or by the application of ligatures to any wounded vessels. In cases where a severe compound fracture or wound necessitates amputation, it will be much better for the surgeon to operate on the spot, especially if it be several miles from an hospital, for the shock and loss of blood occasioned by the accident, and by bringing the patient such a distance, often renders an operation in such cases most unsatisfactory. I am quite sure many of the cases of severe railway and other injuries, which require amputation of a limb or limbs, would have a much better chance of recovery if the operation was performed as soon as possible after the accident, and before the patient has been subjected to the fatigue and exhaustion dependant upon his being carried for some distance to an hospital.

When a case of injury is brought to an hospital, the house-surgeon or dresser in charge should at once carefully examine the patient; and if it is a case which is likely to be the subject of judicial investigation, it will be right to take a note of the hour and day of admission, and of the nature of the injury or injuries, for he may very likely be called upon to give evidence in court in regard to these questions. If, after a careful examination, the case be found to require a capital operation, or some more experienced advice, the acting-surgeon or assistant-surgeon should be sent for, and the necessary instruments prepared; but if the case be of a simple nature, the house-surgeon or dresser ought himself to adopt the proper treatment for it.

The house-surgeon or dresser is frequently called upon to treat injuries of the head. These injuries are often difficult to diagnose, owing to the fact that they may be complicated with the effects of alcohol, opium, or other drugs, or may be simulated by certain diseases of the brain, such as apoplexy. Let me, therefore, just say a word or two generally in regard to these cases. When a patient is brought to hospital in an insensible state, the house-surgeon or dresser should endeavour to get from the persons who conveyed him some account of the case. If the history is clear, the diagnosis may not be so difficult; but in many instances there is little reliable information to be obtained. The patient's head should then be carefully examined, and if there is any wound discovered, the finger ought to be inserted into it, in order to determine whether or not the bones of the skull are injured. His or her breath should also be smelt, in order to find out if it has an alcoholic or other odour. If, on careful examination, no injury of the head or bleeding from the ears, sufficient to explain the symptoms, is discovered, the patient should be treated according to his condition. When his pulse is strong but irregular, and his breathing laboured, and especially if his breath have an alcoholic or opium odour, the stomach-pump should be at once introduced, and the contents of the stomach removed. If this has no effect in relieving the insensibility, the head should be shaved, an enema administered, and counter-irritation applied to the lower extremities. When, however, the patient has a weak, feeble pulse, and is in a collapsed state, small quantities of stimulants should be carefully given, and if the collapse continues, galvanism cautiously employed to the surface of the body. Exceptional cases may occasionally be met with which require special treatment, but I think the rules in regard to the treatment of this class of cases which I have just mentioned will be found the safest and best in practice.

In injuries of the back, abdomen, pelvis, or perinæum, it is a useful rule always to pass a catheter into the bladder, in order to ascertain if the urethra or bladder has been injured, or if there is any retention of urine.

Bruises.—These injuries are of frequent occurrence, and vary much in their severity according to the cause of their production. The usual effect of a bruise is more or less extravasation of blood into the surrounding tissues, giving rise to discoloration (ecchymosis). The amount of ecchymosis varies in different bruises. It is especially marked in regions where the areolar tissue is loose, as in the eyelids, scrotum, and labiæ. In bruises of the scrotum, which are severe, the parts may be almost black in colour. When deeper textures are bruised, the discoloration may not be very marked at first, but only become apparent a few days after the injury. After a bruise has been inflicted, the extravasated blood undergoes a change, so that in a few days the discoloration becomes of a yellow, brown, or greenish hue. In examining police cases in which the patients have sustained bruises, it is of consequence to determine whether the injury is recent or of old standing. The blood extravasated as a result of a bruise usually becomes gradually absorbed, but in some cases it remains fluid, and gives rise to a fluctuating tumour. This fluid blood may also become absorbed, or it may become surrounded by a sort of cyst or wall. Suppuration occasionally occurs in these collections of fluid. Bruises of the scalp may give rise to a tumour, the centre of which is soft, and the circumference firmer in consistence. Consequently, when the point of a finger is placed on the centre of such a tumour, it sinks into it, and feels somewhat as if the bone itself was depressed. By pressing firmly on the margin of the tumour, it will be found that the bone is in its proper position. Suppuration, and even mortification, may follow a bruise; but care must be taken not to mistake the fluctuation of fluid blood for that of pus. The absence of all inflammatory symptoms in the former case will be the principal means of diagnosing between the two.

Bruises of muscles are sometimes followed by atrophy of their tissue. Bruises of nerves are apt to be followed by painful symptoms, and to lead to paralysis and changes in the nutrition of the parts which they supply.

Treatment of Bruises.—Keep the part at rest, and encourage the absorption of the extravasated blood. If extravasation is still going on, apply cold by means of ice or cold water. If the bruise is slight, no treatment is, as a rule, required. A little tincture of arnica, either diluted or pure, may sometimes be applied to the part with advantage, as it appears to hasten the absorption of the blood. In more severe bruises, the application of warm fomentations will be found most grateful. When the blood remains fluid for some time, and does not become absorbed, a stimulating lotion or a fly-blister should be applied over the part. The muriate of ammonia, spirit and vinegar lotion, is an excellent one for this purpose.

If these means fail, and the collection of fluid be large, it is best to tap the tumour, draw off the fluid, and then apply the stimulating lotion or blister. When suppuration or sloughing follows a bruise, it must be treated, by the usual means. Bruises of muscles and nerves must be treated, in the first instance, by rest and fomentation, and if paralysis or other bad effects result, by stimulating applications and galvanism.

Bruises and Sprains of Joints.—Bruises of the larger joints may be followed by faintness or collapse, and by local symptoms, which sometimes simulate a dislocation. The treatment of bruises of joints is to keep the affected joint at rest. If advisable, a splint should be applied in order to do this more efficiently. In bruises of the hip-joint, the long splint ought to be applied.

Sprains of joints are very common, especially in the ankle and wrist. These injuries are often attended with sickness and even fainting at the time of their infliction, and considerable swelling of the joint may follow them. After a joint has received a severe sprain, it not unfrequently remains stiff, swollen, and painful for many weeks or months. In unhealthy constitutions sprains may lead sooner or later to disease of the articulation. Sprains should be treated by rest of the joint and the application of warm fomentations. Warm water poured on the affected joint from some little height is often very useful in these cases. If the stiffness and swelling remain for some time, stimulating liniments and friction must be employed. Wet bandages applied round the joint are often also of service in treating old sprains.

Contusions.—The chest, abdomen, and pelvis occasionally suffer from contusions which may only affect their walls, or may injure the important viscera contained in them. Contusions of the walls of the chest are frequently associated with fracture of the ribs, and more rarely with rupture of the lungs or heart.

Contusions of the abdomen may be confined to the external walls, or may be complicated with rupture of the peritoneum, intestines, gall bladder, liver, spleen, or kidneys.

Contusions of the pelvis may be complicated with fracture of the bones and with laceration, or rupture of the bladder, urethra, uterus, or vagina. When any of the viscera of the thorax, abdomen, or pelvis are injured in this way, the accident has generally been caused by some heavy body passing over the cavity in which they are contained, or by a severe blow, fall, or squeeze. These injuries are always attended by serious symptoms, and in most cases prove fatal in a short time; but not necessarily so, as cases have been occasionally met with in which recovery has followed a laceration or rupture of the liver or other viscus. The symptoms of these accidents are more or less collapse, and generally pain in the region of the injured organ. Simple contusions of the walls of these cavities may give rise to collapse and other symptoms, but, as a rule, these are only temporary, and pass off in a short time. When an important viscus is injured, the collapse and other signs usually continue until the patient dies, or if he lives long enough, are followed by symptoms of an inflammatory nature.

The treatment of these severe contusions can only be palliative. The patients should be confined to bed, and any distressing symptoms relieved by the use of local or general sedatives, and if there is much collapse, small doses of stimulants may be given.

Rupture of the Bladder.—This injury is diagnosed by pain in the lower part of the abdomen, urgent desire to make water (no urine, or only a few drops coming away during these efforts), and more or less collapse. The patient may die very soon, or may live for several days, and then sink from the effects of peritonitis, the symptoms of which usually soon follow this accident. If a catheter be introduced, a little urine, sometimes tinged with blood, may be drawn off, but the amount is generally small. Cases are on record in which several pints of fluid have been removed after this injury, and this appears to have depended upon the fact that the catheter had been pushed through the rupture in the bladder into the peritoneal cavity, and had drawn the fluid from that situation. Cases of this injury are also occasionally met with in which the patient has been intoxicated at the time of the injury, and has therefore felt no symptoms until those of peritonitis have shown themselves. The treatment of this accident is to carefully draw off the urine, every three or four hours, by means of an elastic catheter, and to treat the peritonitis by means of opiates and warm applications to the abdomen.

Rupture of the Urethra.—This accident is generally produced by falls or blows upon the perinæum, by lacerations of the perinæum, or fracture of the bones of the pelvis. Such injuries may tear the urethra only, or may completely sever it. The symptoms of this accident are difficulty and pain in making water, bleeding from the urethra (in some cases there may be no blood at first, or the water may be only slightly tinged with it), retention of urine, and more or less swelling of the perinæum, which at first depends upon extravasation of blood or urine, and afterwards, if the case has not been actively treated, upon the inflammation and its results, produced by the infiltration of urine. The extravasation of urine is the most serious result of this accident, for the presence of urine in the tissues speedily gives rise to inflammation, suppuration, and sloughing.

The treatment is to introduce a catheter into the bladder, and tie it in for a few days. When the catheter cannot be introduced, a free opening should be made in the middle of the perinæum, quite down to the ruptured portion of the urethra. If extravasation of urine has taken place, which will be determined by the swelling and inflammatory symptoms, make a free and deep incision into the centre of the perinæum. When the urine has become extravasated into the tissues of the scrotum and abdominal walls, free incisions should be made in these situations also, and hot poultices applied and changed constantly. In cases where the surgeon has found it necessary to make a free opening into the perinæum, or where the accident has inflicted a wound, it will not usually be necessary to keep an instrument in the bladder, provided the urine is escaping freely by the wound or by the natural passage.

Contusions of the Brain and Spinal Cord.—Contusions received on the head or other parts of the body, may give rise not only to bruises of the soft parts and fracture of the cranial or vertebral bones, but also to injuries of the brain or spinal cord. Such accidents are generally followed by partial or complete interference with nervous function. I have, at the beginning of this chapter, referred to the difficulty not unfrequently experienced in diagnosing injuries of the head, and will therefore here only describe the symptoms and treatment of some of these injuries as they are met with in uncomplicated cases.

Concussion of the Brain.—This condition may be the result of injury applied directly or indirectly to the head, and varies in intensity in different cases. The symptoms of this accident are more or less insensibility (not usually complete), weak pulse, pale countenance, cold skin, and the breathing feeble, but natural. These symptoms may last only a few minutes, the patient rapidly recovering from them; or they may continue for several hours, or even days. Very often an attack of vomiting is the first sign of recovery in cases of concussion. Patients who have sustained a concussion of the brain generally suffer from pain and giddiness in the head for some time after, and in certain cases the accident is followed by symptoms of inflammation of the brain and its membranes. A patient who has received a severe concussion of the brain may never rally, but die in a short time. In other cases, the injury is followed by paralysis, and by loss of one or more of the senses, which may be temporary or permanent.

Treatment.—Keep the patient perfectly quiet and at rest, and when reaction takes place, endeavour to prevent its becoming too excessive. Patients who have suffered a distinct concussion should always be kept quiet for some time after the accident, and their bowels and diet carefully attended to.

Compression of the Brain.—Compression of the brain may be caused by a portion of fractured bone which has been forced down upon it, by extravasation of blood, either on to or into the brain, or by pus and other products the result of inflammation. The symptoms of compression are complete insensibility, laboured and stertorous breathing, with often a peculiar whiff at the corner of the mouth, and a slow and laboured pulse.

Treatment.—This will depend upon the cause producing it. If a depressed fracture of the skull exists, the acting-surgeon, or assistant-surgeon, should be sent for to raise the depressed bone. In cases where no depressed bone is found, the symptoms usually depend upon extravasation of blood within the cranium, and therefore means should be used to endeavour to check further extravasation. These means consist in keeping the patient perfectly at rest, applying cold to his head, and, if sensibility returns, endeavouring to keep down inflammatory symptoms by careful attention to his bowels and diet.

Concussion and Compression of the Spinal Cord.—The spinal cord may suffer from these conditions owing to the same causes as those which produce them in the brain, and in consequence, the extremities or other parts of the body may become weak, or completely or partially paralysed.

Treatment.—This will be much the same as that of concussion or compression of the brain—namely, to keep the patient quiet, and endeavour to avoid excessive reaction or inflammatory symptoms. When the bladder is paralysed, the urine must be regularly drawn off, and the paralysed parts protected as much as possible from any pressure or undue stimulation.

Rupture of Muscles and Tendons.—Muscles are not often completely torn across, much more frequently a few of their fibres only are ruptured. The muscles which are most liable to this injury are the gastrocnemius, rectus femoris, biceps humeri, and recti muscles of the abdomen. The latter are occasionally torn across in the spasms of tetanus. The symptoms of a rupture of a muscle are sudden pain in the part, and interference with the movement of the limb. If the muscle has been entirely torn across, an indentation or separation can be felt between the ruptured ends. There is also usually a considerable amount of blood extravasated into the surrounding tissues, giving rise to swelling and ecchymosis.

Tendons may be completely ruptured by accident. The tendo-achilles, tendon of the rectus femoris, and triceps humeri are those usually injured in this way. The symptoms are the same as those of a ruptured muscle, only there is not usually so much extravasation of blood or swelling.

Treatment.—The treatment of both these injuries consists in bringing the ruptured ends of the tendon or muscle in apposition with one another, and retaining them there until they have united. For this purpose the limb should be kept at rest, and placed in the best position for relaxing the injured structure. If this is not sufficient, a bandage or other appliance should be employed. In treating a rupture of the tendo-achilles, a slipper should be placed on the injured foot, and attached to its heel there should be a strap or bandage which should pass up the back of the leg, and be connected to a bandage or belt adjusted round the thigh immediately above the knee. This apparatus keeps the leg flexed and at rest.

Wounds.—Wounds of all kinds are of daily occurrence, and therefore constantly come under the notice of the house-surgeon or dresser. Wounds may be simple in their nature, or complicated with injuries of the blood-vessels, joints, bones, or important cavities.

Whenever wounds are suicidal or homicidal, the house-surgeon or dresser should carefully note their nature, direction, and situation; for his evidence as to the manner in which they were caused, and the kind of instrument which produced them, will frequently be required.

Incised Wounds.—These wounds may be inflicted on any part of the body, and vary in extent, direction, and depth. If they should be situated in the region of important blood-vessels, they may give rise to much bleeding, either from wounding these vessels or their branches. Incised wounds should always be carefully examined, in order to determine that no foreign body has become lodged in them. The amount of gaping in an incised wound varies in different cases. Transverse wounds usually gape more than longitudinal ones.

Treatment.—Stay all bleeding, clean the wound thoroughly, bring its edges accurately in contact by means of wire or other sutures, and then apply some dry-dressing in the manner shown at fig. 1, at the same time keeping the part at rest, and attending to the patient's general health. If the wound is small and superficial, sutures are not usually necessary, but its edges may be kept in contact by strips of sticking-plaister. In wounds of the lips, nose, eyelids, or other parts of the face, special care should be taken to bring their edges accurately in contact, so as to leave as little deformity as possible. In wounds of the scalp, it is not usually necessary to apply sutures, unless a flap or flaps have been displaced; for the dry-dressing can generally be applied and secured so as to keep the edges of the wound together. Wounds of the scalp should always have the hair cut or shaved off round their margins, and should also be carefully examined, in order to see that no injury to the bones of the skull exists, and that no foreign body has lodged. Wounds in this region are not unfrequently followed by erysipelas, irritation of the glands of the neck, or diffuse suppuration; and, therefore, patients suffering from these injuries should be carefully treated, and their diet regulated.

When an incised wound does not heal by the first intention, it must be treated with water-dressing, like a granulating wound.

Punctured Wounds.—These wounds, when deep, are apt to be serious, as they may involve large arteries or veins, or may open into some of the cavities, and cause serious hæmorrhage, which is most frequently internal, owing to the smallness of the wound preventing the blood escaping externally. Stabs inflicted by knives, daggers, or other sharp-pointed bodies come under this class of wounds. These injuries may be superficial, or may penetrate the chest, abdomen, or pelvis. Patients who have received merely a superficial stab will occasionally suffer from collapse, great mental anxiety, and, in fact, have all the symptoms of a more serious injury. If the wound be slight, these symptoms will soon pass off.

Treatment.—Repress all bleeding. If a large artery be wounded, carefully enlarge the wound, and ligature it. If the bleeding comes from a smaller vessel or vessels, apply a compress over the wound, and if the wound is wide enough, stuff it with lint or linen as well. When the bleeding is only slight, a little wet lint or linen may be placed over it. If inflammation and suppuration attack the wound, it may be necessary to enlarge it, in order to allow the discharge to escape more readily.

Contused and Lacerated Wounds.—These wounds may be more or less of an incised nature, complicated with some bruising of the surrounding parts, or they may consist of severe laceration and destruction of the tissues. Portions of the body may be torn off, leaving a lacerated wound. A portion, or the whole, of a finger or thumb is occasionally torn off, and along with it a considerable piece of tendon. The entire scalp, or part of it, is sometimes torn off in females whose hair has been caught in machinery, or otherwise violently pulled. Wounds of the scalp and forehead, which have been produced by a blunt instrument, not unfrequently resemble in appearance incised wounds. It is of importance to know this in connection with medico-legal cases.

This class of wounds, except when they occur in the face, rarely heal by first intention, but suppurate and heal by granulation.

Treatment.—Apply cold-water dressing until all bleeding has ceased; and when inflammatory symptoms appear, warm-water dressing or poultices should be used until a healthy granulating sore remains. If a portion of the scalp, or other part of the body, has been completely torn off, it will be right to replace it, and endeavour to get it to unite again. The best method of retaining such a part in position is, to exercise gentle pressure upon it, by means of a compress and bandage, or by strips of sticking-plaister.

When much of the soft texture of a limb has been destroyed, amputation may be necessary. In treating lacerated wounds, where it is desired to get a good union between their edges, it is sometimes a good plan to cut off any lacerated or bruised tissue which is likely to suppurate or slough.

Poisoned Wounds.—All kinds of wounds may be complicated by the introduction of poisonous matters; and, in consequence, they may be followed by local inflammatory symptoms, and more or less constitutional disturbance. Cooks, butchers, fishermen, and other individuals are liable, in following their different employments, to receive wounds complicated with the introduction of fresh or putrid animal matter. Whitlows and diffuse cellular inflammation are generally the result of these injuries.

Treatment.—Soothing local applications, such as warm bathing and poultices, incisions to let out pus, and proper constitutional treatment.

Bites.—The bites of all animals, even when healthy, are often slow to heal, and not unfrequently give rise to considerable local irritation. The bites of animals affected with hydrophobia may cause this disease in man. The bites of poisonous reptiles also lead to serious or fatal results, but in this country these injuries are rarely met with. The bite of the common adder may cause considerable local and general irritation, but rarely proves fatal. Wounds inflicted by the bites of animals may be small and punctured, or they may be lacerated. The bite of the horse generally causes a lacerated wound, and occasionally a portion of flesh is entirely torn off by this animal.

The bites and stings of certain insects occasionally cause much distress, and when a patient is attacked by a large number of insects, and stung over a considerable surface, the local and constitutional irritation may be very severe.

Treatment.—If the animal which inflicted the bite was healthy, it is only necessary to treat the wound in the ordinary way; but if the animal was suffering from hydrophobia, the bitten part should be cut out, or nitrate of silver applied freely to all parts of it. In bites of poisonous reptiles the same local treatment is necessary; and, in addition, ammonia or arsenic ought to be administered internally. When a patient is stung, the sting or stings should be extracted as soon as possible, and some oil rubbed over the surface.

Gunshot Wounds.—These injuries may be inflicted —1st, By explosions of gunpowder or gun-cotton alone. 2nd, By wadding or other soft substances, propelled by gunpowder or gun-cotton. 3rd, By shot, shell, bullets, or other hard substances propelled by gunpowder or gun-cotton. The first class is not uncommon in civil practice, as a result of explosions of gunpowder contained in flasks or other receptacles, or of blasting in quarries or other places. The result of these injuries varies; in some cases the skin is only scorched or burnt, and the grains of the powder driven into it, so as to produce a kind of tatooing; in other cases lacerated wounds are made, and occasionally portions of the body are completely torn off.

The treatment of these accidents will depend on their nature. If the skin is scorched, the case should be treated like a superficial burn, the grains of powder being picked or washed off as carefully as possible. In more severe cases, the injury must be treated as a lacerated wound. Wadding or other substances, when propelled from a gun, rifle, pistol, or cannon, may penetrate the body and cause wounds. Such injuries may prove fatal if the body be forced into important regions. Combined with the wound, there may be more or less scorching of the skin if the firearm has been exploded near the surface of the body. Portions of a patient's clothes are also occasionally driven into the body.

The treatment of these kinds of injury will be to remove all foreign bodies which may have been forced into the wound, to stay bleeding, and then apply water-dressing.

Charges of small shot, small stones, bullets, pieces of metal, or other hard substances, may be forced into the body, and lodge there, or pass completely through. A charge of small shot, when fired close to the body, may pass in like a bullet, and lodge, or pass out again, in the latter case causing a wound of entrance and exit. If the gun has been fired at some distance, the shot is more or less scattered, and, therefore, when it strikes the body it does so in different parts, causing numerous openings. The shot may pass out again, or lodge either in the superficial or deep tissues. A single small shot may penetrate the eye-ball, and give rise to serious results. When a charge of small shot has lodged, its situation should be ascertained by probing, and then it should be carefully extracted, either by enlarging the wound of entrance, or by making an incision over its position. When single shot have become lodged or scattered over a considerable surface, they may be cut out if they are lying in the superficial tissues. Those in the deeper parts should not be interfered with. Wounds inflicted by bullets, or other pieces of metal, and hard substances, vary in their nature. Such bodies may lodge in the tissues, or they may pass out again after causing more or less injury, according to the direction they take, and the regions through which they pass. The round bullet occasionally lodges, the conical one rarely. The latter, as a rule, causes much greater destruction of both hard and soft textures than the former. When a bullet penetrates the body, it causes an opening, the edges of which are inverted (opening of "entrance") and if it pass out again, another opening, the edges of which are everted and ragged (the opening of "exit"). The opening of exit is usually also larger than that of entrance. Bullets and other missiles sometimes carry along with them into the body portions of the patient's clothes or other materials, which may become lodged in some part of the wound. Bullets occasionally take curious directions. They may pass all round or partially round the head, limbs, or trunk, and come out again at points opposite or near their entrance. Such cases often look as if the bullet had passed completely through. Large portions of metal may be driven into the body, and either lodge or pass out again. These bodies will cause wounds according to their shape and size. The treatment of this class of injuries will be, first, to ascertain if the bullet or other body has lodged, and if so, to extract it either through the opening of entrance, or by an incision made over its point of lodgment. Any bleeding from these wounds should be stayed by plugging the wound, and if this is not effectual, by enlarging it, provided this can be done without injury to important structures, and securing the bleeding point. If the large blood-vessels, joints, or bones of the limbs, have been injured, amputation will in most cases be advisable.

Accidents resembling those caused by explosions of gunpowder are sometimes met with as a result of the explosion of gases in mines or other places, and require to be treated on the same principles.

Wounds of Joints.—Wounds of joints may be incised, punctured, or lacerated. A wound may pass entirely across a joint, and freely lay open its cavity, or it may merely open into it to a small extent. Lacerated wounds are often associated with partial or complete dislocation of the bones connected with the joint. If the wound be not very large, it is sometimes difficult to determine whether or not the joint is implicated. An escape of synovial fluid will in some cases assist the diagnosis. Wounds of joints are usually followed by more or less inflammation, which may lead to suppuration and disorganisation, or to anchylosis of the articulation.

Treatment.—Place the joint in an easy position, and keep it fixed there by means of a splint or other appliance, and endeavour to get the wound to heal immediately, either by means of a dressing of dried blood or collodion. The wound should never be probed unless a foreign body has passed into it, and the patient should be carefully guarded from any local or constitutional irritation. When inflammation and suppuration of the joint take place, the proper remedies must be used. When there is bleeding from the wound, it should be kept open, for if closed, the blood is apt to accumulate in the joint. If the wound be a lacerated one, and the other tissues injured, excision or amputation will in most cases be required.

Wounds of the Orbit and its Contents.—A sharp-pointed body is sometimes thrust through the orbital cavity into the brain, and may lead to serious or fatal symptoms. Such injuries occasionally cause little outward injury, as the instrument or body may have been introduced under the eyelid. The eye itself may be injured by a wound which may affect the conjunctiva, cornea, or sclerotic alone, or may also implicate the deeper parts of the globe. Wounds of the conjunctiva are not generally serious, and only require the eye to be kept at rest and bathed with warm water. The cornea may suffer from slight abrasions, which are often very painful. It may also be wounded through a certain extent of its thickness, or a wound may pass entirely through it, and involve the iris or even the lens. Such wounds are sometimes complicated by the introduction of foreign bodies. If the wound is large, a portion of the iris is apt to protrude. When this takes place, the prolapsed portion should be gently replaced; and if this cannot be done, it should be left alone in the first instance.

Wounds of the cornea should be treated by keeping the eye at rest, closing the lids, and using means to prevent inflammation. Wounds of the sclerotic may be superficial, or may involve the choroid and retina, and permit of the escape of some of the vitreous humour. Foreign bodies, such as small shot, are occasionally driven through the sclerotic, and usually give rise to inflammation and destruction of the eye. The treatment of these cases is to keep the eye at rest, and treat inflammatory symptoms.

Wounds of the Tongue.—This organ is sometimes wounded, most frequently by the teeth. The injury usually requires no treatment. If the wound be extensive, one or more silk sutures may be applied to keep its edges together, and the mouth occasionally washed out with warm water, or some gentle astringent lotion.

Wounds of the Throat.—These wounds are generally either homicidal or suicidal, and vary in their situation, direction, and extent. They may be incised or punctured, most frequently the former. Wounds of the throat may be quite superficial, or may pass through the important structures of the neck. The house-surgeon or dresser should always carefully note the number and direction of these wounds, for he may be asked to give evidence as to whether they were inflicted by the patient, or by some other person. Punctured wounds may open into one of the large vessels, or may pass down into the larynx or trachea. When the trachea is punctured, emphysema of the neck sometimes results.

Incised wounds are usually across some portion of the anterior aspect of the neck, between the chin and sternum. Cases have been recorded in which such wounds were made across the back of the neck, but these are rare. Wounds in front of the neck may be situated (1), Between the lower jaw and hyoid bone. (2), Between the hyoid bone and thyroid cartilage. (3), At some point between the thyroid cartilage and sternum. The first of these is not usually so dangerous as the others, although the muscles of the tongue and even the lingual vessels may be divided. The second kind of wound is often dangerous, owing to the fact that the epiglottis and upper part of the larynx are usually more or less injured, and, in addition, the thyroid and lingual arteries may be wounded, and cause considerable hæmorrhage. These wounds are apt to be followed by difficulty in breathing and cough, owing to the interference with the proper action of the larynx. The third class of wounds may involve the larynx, and is then usually accompanied by interference with respiration, or it may divide the trachea partially or completely. In severe cases both the trachea and œsophagus may be divided, and sometimes the carotid vessels also.

Treatment.—Stay all bleeding, and then, if the wound is quite superficial, bring its edges together by means of sutures, and by keeping the patient's head in the bent position. When the wound has opened into the pharynx, larynx, or trachea, its edges should *never* be brought together by sutures, but should be allowed to remain open, in order that blood, mucus, or other matters, may pass out externally.

The patient must be kept perfectly at rest, with his head bent towards his chin. · Inflammation of the larynx or trachea frequently results from these injuries, and may necessitate tracheotomy to prevent suffocation. If the trachea is already wounded, it will usually be sufficient to insert a tube into it, enlarging the original wound if necessary. Bronchitis not unfrequently follows cases in which the larynx or trachea has been involved, and must be treated by the usual remedies. When the pharynx or œsophagus is opened, the patient must be fed by a tube passed through the mouth, and beyond the wounded part. Suicidal wounds are often complicated with an unhealthy condition of the patient's mind, which appears to interfere with recovery.

Wounds of the Chest.—The cavity of the chest may be opened into by a punctured, lacerated, or incised wound. Such wounds may penetrate the chest without injuring its viscera; but more frequently the lungs, heart, or large vessels are implicated. In wounds of the chest a portion of the lung sometimes protrudes ("hernia of the lung"). The intercostal or other vessels in the walls of the chest are occasionally wounded, and may give rise to hæmorrhage externally, or into the cavity of the pleura. When the lung itself is wounded, hæmorrhage takes place externally, into the tissue of the lung, into the bronchial tubes, or into the cavity of the pleura. There is usually also more or less escape of air, which may lead to emphysema of the walls of the chest and other parts of the body. Not unfrequently also air escapes, together with blood, into the bronchial tubes, so that the latter is coughed up in a frothy state. A wound of the lung will, therefore, be diagnosed by the escape of blood and air through the mouth or external wound, or through both, by difficulty in breathing and a painful sensation in the chest, with an almost constant cough. Occasionally the lung is wounded by a fragment of a broken rib, and the same symptoms may be present in consequence.

Treatment.—Keep the patient perfectly quiet, stay superficial bleeding, and when all hæmorrhage has ceased, apply a compress over the wound, and a bandage round the chest. Ice has occasionally been applied with advantage to stop the bleeding, and sucking small pieces of the same is usually very grateful to the patient in these cases. If there is much bleeding going on, the external wound should not be closed. Wounds of the intercostal arteries must be treated by enlarging the wound, if necessary, and securing the wounded artery, or applying a compress over it. If the wound should have opened into the pleura, the external wound ought to be kept open, to allow the blood to escape, and cold applied, together with constitutional treatment, which will be useful in staying hæmorrhage. When the lung protrudes, it must be replaced, and if this cannot be done, it should be left, and afterwards ligatured. The emphysema requires no treatment; if it is extending quickly over the body, the external wound should be kept open, in order to allow the air to escape through it. When inflammatory symptoms show themselves, they must be treated according to their nature. If blood or air accumulates in the pleural cavity, and threatens to suffocate the patient by compressing the lung, the external wound must be enlarged or the chest tapped.

The pericardium and heart are sometimes wounded. When this occurs, death usually takes place very speedily. There are, however, cases on record in which patients have lived for days, and in one or two cases for weeks, after receiving a wound of the heart. Wounds of the large vessels are generally fatal. Little can be done in the way of treatment in wounds of the heart, except to keep the patient at rest, and endeavour to stay hæmorrhage.

Wounds of the Abdomen.—These injuries may be punctured, incised, or lacerated, and may only penetrate the peritoneal cavity, or may wound some of the viscera. When the peritoneal cavity is laid open by a wound, portions of the intestines, omentum, or other viscera may protrude externally. Such protruded parts should be carefully cleaned and returned, the edges of the wound being incised, if necessary, to permit of this, and the margins of the wound in the abdominal wall brought carefully together with sutures. If a piece of omentum protrudes and is much lacerated, it is better to apply a ligature round its base, and then either cut it off or allow the ligature to destroy it by strangulation. When the intestines or stomach are wounded, the edges of the wound should either be accurately adjusted by means of the continuous suture, and the viscus returned into the abdomen, or the wounded organ stitched to the external wound, so as to form an external fistula or artificial anus. When the wound in the viscus is small and punctured, no treatment is usually necessary. In all cases where the abdominal viscera are wounded, the inflammatory symptoms which follow these injuries must be carefully treated. Small doses of opium, given regularly every two or three hours, are very useful in treating inflammatory affections of the abdominal contents.

Wounds of the Pelvis.—These injuries may implicate some of the contents of the cavity. The bladder, uterus, vagina, urethra, or rectum is occasionally injured by punctured, lacerated, or incised wounds. Such accidents must be treated by endeavouring to stay any external or internal hæmorrhage, and by preventing or diminishing the inflammatory symptoms which result from them. The perinæum, scrotum, and penis are sometimes wounded. In wounds of the scrotum one or both testicles may protrude. Wounds of the penis may bleed freely if its vascular tissue be implicated. The treatment of all these injuries must be conducted on the same principles as those recommended in similar injuries of the abdomen. When the testicles protrude in wounds of the scrotum, the skin must be drawn well over them, and retained there by means of sutures or strips of plaister. The application of cold usually stays the bleeding in wounds of the penis.

Introduction of Foreign Bodies.—Foreign bodies may be forced into the soft or hard textures, and into the larger cavities, or may become lodged in certain of the canals or passages. Porous bodies, such as pieces of wood, cloth, &c., when introduced into the tissues, usually give rise to inflammation and suppuration, and should therefore be removed as soon as possible. Metallic bodies, such as pins, needles, portions of knives, bullets, &c., do not cause so much irritation, and may remain in the tissues without doing much harm. Needles and pins, or portions of them, when introduced into the body, often travel about and work their way out at some point away from that where they entered. Occasionally, however, such bodies have opened into important cavities, or injured large blood-vessels.

Treatment.—Foreign bodies should always be removed as soon as possible, if they can be detected, either by enlarging the wound by which they entered, or by cutting down upon the body itself. Portions of pins and needles should be carefully searched for by feeling the tissues all round their place of entrance, and if detected, removed; but if they cannot be felt, they should be left alone. When a foreign body is lodged near an important cavity or structure, great care should be exercised in its removal.

Foreign Bodies in the Eye.—Lime, sand, dust, and other substances are sometimes forced into the eye, and may become lodged under the eyelid. The treatment of these cases is to remove the particles of lime or other substance with the forceps or scoop, the upper lid being everted if necessary, or by carefully syringing the lids with tepid water. The latter method should be adopted when any quantity of the foreign body has become lodged between the lids, or when the removal of them cannot be accomplished by other means. Melted metal, some of the mineral acids or other chemical substances, are occasionally also driven between the eyelids, and burn their internal surface, as well as other portions of the eyeball. The treatment of such accidents will be, to remove any metal which may have lodged, to get rid of any irritating fluid by injecting tepid water, and then to drop a little oil between the lids. Warm fomentations and other treatment must also be used to relieve as much as possible the inflammatory symptoms which follow. In cases where the conjunctival surfaces of the lids granulate after such injuries, care must be taken to prevent adhesion occurring between the lids and the globe.

Small fragments of metal, stone, or other materials are often forced into the eye and become lodged in the cornea. These bodies ought to be carefully removed by a small scoop, blunt needle, or similar body, and any inflammatory symptoms which may result properly treated.

Foreign Bodies in the Nose.—Pieces of wood, cork, pencil, peas, beans, and other small bodies are occasionally introduced into the nasal passages, and, in some cases, cause bleeding or obstruction. These injuries are most frequently met with in children. If the body is not removed early, it may give rise to irritation and discharge of matter, and I have known a nasal calculus form round such a body. These bodies, if small, are sometimes difficult to detect; and, in such cases, the child should be put under the influence of chloroform, and the passages carefully searched with a probe, or with a pair of polypus forceps. When the body is discovered, it ought to be laid hold of and extracted.

Foreign Bodies in the Ear.—Similar substances are sometimes introduced into the ear; and, when attempts are made by the patient, or their friends, to remove such bodies, it often happens that they are driven further into the meatus. These bodies are generally readily detected, either by the sight or feel. When the patient is a child, it is much better to administer chloroform at once, as the parts are sensitive, and it is almost impossible to remove the foreign body if the patient is struggling. The treatment consists in removing the body, taking care not to drive it further down, or injure the tympanum. A very useful kind of forceps for removing these bodies is what is called the "ring forceps;" but, if these be not at hand, a pair of fine dissecting forceps may be employed. When the body is a rounded one, there is sometimes a difficulty in seizing it; but, by a little care, and by gently insinuating the blades of the forceps between the body and the sides of the canal, the extraction is generally satisfactorily accomplished. If the body cannot be extracted in this way, syringing the ear with tepid water should be tried.

Foreign Bodies in the Pharynx and Œsophagus.—Portions of food may become lodged in the pharynx, and cause speedy suffocation, by obstructing the upper part of the larynx. Patients are occasionally brought to an hospital choking, or in a state of insensibility, from this cause. The history of such cases is, generally, that the patient has been eating, and at the same time laughing, talking, or singing (not unfrequently, he or she has been also suffering more or less from intoxication), when a fit of sudden choking has come on, and been quickly followed by insensibility.

If the piece of food which is lodged in the pharynx be not speedily extracted, or pushed down the œsophagus, the patient very quickly dies from suffocation: and, therefore, when a house-surgeon or dresser is called to see a patient with such a history, or who has been attacked with a sudden fit of choking or insensibility, he should at once pass his fingers, or a pair of long forceps, down the patient's throat, and, if he detects a foreign body, remove it. Even if the patient is apparently dead, this ought to be done; and, if a foreign body be discovered and removed, artificial respiration should be kept up for some time. If the foreign body cannot be immediately removed, and the patient is suffocating, a knife should be plunged through the crico-thyroid membrane, or into the trachea. Pins, needles, fish-bones, and other sharp bodies are occasionally entangled in the fauces, soft palate, or pharynx, and give rise to unpleasant tickling or cough. Very frequently, too, patients apply for advice, under the impression that something is sticking in the throat, when, in reality, their symptoms merely depend upon the sensation left by a prick or wound of such a body which has passed down the throat. The treatment of these accidents is, to search the throat carefully with the fingers, or with the œsophagus forceps, and, if any foreign body be detected, to extract it. The œsophagus forceps is a most useful instrument in treating all cases of lodgment of foreign bodies in the pharynx or œsophagus; and I have, therefore, represented a pair, at fig. 38, grasping a foreign body. The blades of these forceps should open laterally.

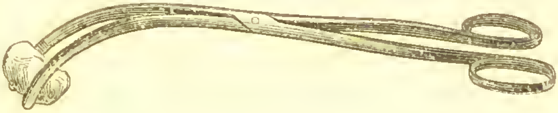

Fig. 38.

Pieces of food, coins, artificial teeth, bones, and other irregular bodies occasionally become lodged in the œsophagus, and may produce symptoms of suffocation, by pressing upon the larynx or trachea, or difficulty in swallowing. When the body is soft or smooth and regular, it is not so likely to injure the walls of the œsophagus, and, therefore, it may be pushed down towards the stomach by means of an œsophagus bougie or tube; but when it is sharp or irregular, it may lead to ulceration, and may even perforate some of the important blood-vessels. Such bodies should be extracted by means of the forceps, and if they cannot be reached by this instrument, the operation of œsophagotomy must be performed.

Foreign Bodies in the Air Passages.—Small coins, portions of food, beans, peas, seeds, buttons, and other foreign bodies, may pass through the rima glottidis, and either become lodged in the larynx, or pass down into the trachea, or even into the bronchial tubes (usually into the right one). Such accidents generally give rise to spasmodic cough and symptoms of suffocation, which may cause immediate death if relief be not given by the removal of the body, or by opening the trachea or larynx. These accidents are not unfrequent in children, and the diagnosis of them is somewhat difficult, unless a distinct history of the nature of the foreign body and the manner in which it was swallowed can be obtained. When a foreign body is lodged in the air-passages, and does not cause immediate death, the symptoms of suffocation and spasmodic cough remain more or less until it has been dislodged or extracted. These symptoms are not always continuous, but the patient may have intervals of complete rest, and even sleep quite calmly.

Treatment.—If the foreign body be a coin or other heavy substance, it may sometimes be dislodged by holding the patient by the heels, with the head downwards, and shaking the body, care being taken that suffocation is not produced by the proceeding. When this method is not successful, or if the body be of another nature, laryngotomy or tracheotomy should be performed at once, when it not unfrequently happens that the foreign substance is expelled through the opening by the force of the cough. If this does not take place, the patient may be inverted and shaken, so as to allow the body to fall out through the wound. When the body can be detected through the wound in the larynx or trachea, it should be laid hold of with forceps and extracted.

Foreign Bodies in the Urethra and Bladder.—Portions of catheters, bougies, and other substances are occasionally lodged in the urethra. These should be removed as early as possible, for they are apt to pass down into the bladder. By retracting the penis these bodies will sometimes be made visible, and can then be seized and withdrawn. If they cannot be thus exposed, a pair of narrow forceps, such as are shown in plate 3, should be introduced along the urethra, so as to seize and extract them. When the body has passed into the bladder, it may sometimes be extracted by means of the lithotrite.

Hair-pins and other bodies are sometimes introduced into the female bladder. In such cases the urethra should be dilated, so as to admit a pair of forceps, by means of which the body may be seized and removed.

Foreign Bodies in the Rectum.—Foreign bodies may be introduced into the rectum through the anal orifice, or fish and game bones, or other substances which have passed along the intestinal canal, may become lodged in this canal. In either instance the body should be extracted, for its presence may give rise to inflammation, suppuration, or ulceration. Masses of hardened fæcal matter sometimes become lodged in the rectum, and prevent the passage of fæces. Such masses should be broken down by means of the finger alone, or with a finger and scoop or spoon, and by injections of warm water.

Scalds and Burns.—Scalds may be inflicted by any hot or boiling liquid or its vapour. Slight scalds are of little importance, but when a considerable surface is implicated, the accident becomes more serious. Persons occasionally fall into vats or boilers containing hot alkali or other fluid, and in consequence have their whole bodies severely scalded. Such cases are generally fatal in a short time. Children sometimes get hold of a kettle, tea-pot, or jug, containing hot water or other fluid, and drink from its spout, the result being a severe scald of the mouth, fauces, and upper part of the larynx. These injuries are in most cases followed very speedily by difficulty in respiration, spasms of the muscles of the throat, and in some cases by vomiting, which symptoms soon cause the patient's death. The treatment of this accident is to endeavour to relieve the inflammation of the larynx and air-passages, and if symptoms of suffocation come on, tracheotomy should be performed, although its result in these cases is not generally satisfactory. Scalds are best treated by the application of dry cotton wadding. If they have caused blisters to rise up, the blisters should be punctured, and then the cotton wadding, or a little greased rag applied. If the scald is slight and painful, a bit of rag dipped in cold water may be placed over it, but it is not advisable to use this treatment in severe scalds.

Burns vary in their degree and extent. They may only affect the superficial part of the skin, causing redness or vesication, or they may destroy its whole thickness. Again, they may destroy the whole soft tissues down to the bone, or may reduce both soft tissues and bone to ashes. Burns are of frequent occurrence as a result of patients' clothes catching fire, and when this takes place, a considerable extent of surface may be injured. When the trunk is burnt, it is more serious than a similar injury of the limbs, and burns are more fatal in old and young persons than in adults. The larger the extent of surface burnt, especially if that surface be on the trunk, the more serious is the case. Patients who have sustained severe burns, are usually in a more or less collapsed state, from which they may never rally. These injuries are liable to be followed, especially in children, by secondary affections of the brain and thoracic and abdominal viscera, which may prove fatal. If a large surface be burnt deeply, the profuse suppuration which results may cause death by producing exhaustion and hectic.

Treatment.—If the burn is quite superficial and limited, a piece of lint or linen dipped in cold water, and placed over the part, will generally be most grateful to the patient. When a superficial burn is extensive, the injured surface should be covered with cotton wadding, and a bandage applied loosely round, so as to keep the dressing in its place. When blisters have formed they should be opened, and then the cotton wadding applied as in the former instance. If suppuration follows these burns, the best dressing is a piece of lint or linen, smeared with some simple grease or ointment. In burns, where a portion or the whole thickness of the skin is destroyed, poultices should be applied until the dead parts separate. If such a burn should be very extensive, it may be difficult to use poultices. In these instances, the burnt parts may be covered by cotton wadding or lint which has been dipped in Carron oil (a mixture of equal parts of linseed oil and lime water), or some simple ointment. Stimulating ointments are sometimes recommended in such cases, to hasten the separation of the sloughs, but their employment gives rise to pain and uneasiness, and is not usually necessary. When the sloughs have separated in severe burns, the sores should be treated with water or other dressing, like an ordinary granulating wound. When the tissues have been completely charred, the case must be treated with poultices until the dead parts separate. If sloughs, the result of a burn, should be deep, and in the region of important blood-vessels, the case should be carefully watched until they have separated, for serious hæmorrhage may ensue, owing to the giving way of an artery or vein.

Opium should be freely given in cases of burns, if there is much pain, and when the patient becomes weak and exhausted, stimulants and nutritious diet must be administered.

Hanging and Strangulation. — A house-surgeon or dresser may be called upon to treat a patient who is in an insensible or semi-insensible state, the result of being suspended by the neck, or of compression applied to this region, by means of a rope or other cord, or the fingers. The face, head, and back of the neck of such patients are usually dark in colour, swollen, and congested. Children and infants, who have been accidentally smothered in bed, are sometimes found in a similar insensible condition; but the congestion and swelling of the face is not present in all such cases. The inhalation of carbonic acid or other gas is an accident which occasionally happens in breweries, in old wells, in mines, and in other places, and produces either complete or partial insensibility. In some of these instances the face is swollen and congested; in others, there is little alteration of the features.

Treatment.—If there should be any rope or other cause which has produced the symptoms still acting, it ought at once to be removed. Endeavours should then be made to stimulate the heart's action by artificial respiration, and by the application of warmth and friction to the surface of the body. If there is much congestion of the face and head, the external jugular vein may be opened. In cases of suffocation, depending upon the inhalation of bad air (as in the case of smothered infants), or of carbonic or other gases, cold water should be dashed on the surface of the body, and then artificial respiration employed, together with warmth and friction.

Drowning.—These cases are occasionally met with in surgical practice, and although they may be almost hopeless, owing to the length of time that the body has been immersed, it is always right to endeavour to restore animation.

Treatment.—This consists in employing artificial respiration, and at the same time thoroughly drying the body, and applying dry heat and friction to its surface. If the patient should be at all sensible, stimulants should be administered by the mouth, and if he is unable to swallow them, they may be given in the form of enemata. The galvanic battery, if at hand, should also be used over the region of the heart.

Artificial Respiration.—There are two principal methods of employing artificial respiration, either of which may be usefully adopted in cases of suspended animation.

The first method is "Marshall Hall's," and consists in placing the patient on his face, and drawing forward the tongue, the right arm being flexed and laid under the forehead, so as to prevent the mouth and nostrils coming in contact with the ground. The patient should then be turned on one side, and half-way on his back, and brought back again on to his face, by laying hold of the left shoulder and hip. This motion is to be regularly repeated every few seconds as long as may be thought right.

The second method is "Sylvester's," and is performed by placing the patient on his back, and drawing the arms gradually upwards over the head, and then bringing them down again to the side, this movement being repeated every few seconds as long as may be advisable. The respiration, when first it returns, may be very feeble, and it may therefore be advisable to assist it by keeping up the movements for some little time, or by placing one hand on each side of the chest and alternately pressing and relaxing them, so as to encourage the natural respiratory movements. This latter proceeding will sometimes be found sufficient in cases of temporary, suspended, or diminished respiration.

Artificial respiration should be persevered with for half an hour at least in cases of suspended animation, where there is any chance of recovery.

Rape and Criminal Assaults.—The house-surgeon or dresser may be called upon to examine children or women on whom rape or criminal assaults have been committed. Patients who have been thus injured should be carefully examined at once, and a note taken of their condition. The state and arrangement of their clothes, and any stains on them, should be first looked at, and then the surface of the body, especially in the region of the genital organs, should be examined, and any traces of bruises or other injury observed, and their nature, whether recent or of old standing, determined. The genital organs should next undergo a thorough investigation, and the state of the external parts and vagina ascertained. If there be any discharge from the vagina, its nature and cause should be inquired into, and, if necessary, it ought to be investigated microscopically. The man or boy accused of the assault may sometimes be brought for examination, in order that the surgeon may give evidence as to his being guilty or not guilty. In such cases, the man's body should be examined for any traces of bruises, scratches, or other injury which the woman may have inflicted upon him in her struggles. His genital organs should be looked at, any injury upon them noted, and the existence or non-existence of venereal disease determined.

Poisoning.—Patients suffering from the effects of poison are often brought to hospitals, and require to be promptly treated. The first thing to be done in the majority of these cases is to get the stomach emptied as soon as possible, and then, if the nature of the poison is ascertained, to administer the proper remedies which will counteract it. The stomach is best emptied either by means of the stomach-pump, or by administering a strong emetic. The emetic generally used for this purpose is a strong solution of sulphate of zinc (a scruple to one ounce of water answers well).

Laudanum, or some preparation of opium, is the poison most frequently taken, and the symptoms which it produces vary in intensity according to the amount swallowed, the constitution of the patient, and the time which has elapsed since the poison was received into the stomach. In the milder cases, the patient is merely drowsy and sleepy ; but, in other cases, there is almost total insensibility, with feeble respiration and contraction of the pupils. Uncomplicated cases of apoplexy can generally be distinguished from those of opium poisoning, by the fact that in the former the patient's breathing is laboured and stertorous.

The treatment consists in introducing the stomach-pump, emptying the stomach, and washing it out with warm water, until all traces of the poison have disappeared from the fluid pumped out. If the stomach-pump is not at hand, an emetic ought to be given immediately, and its action encouraged by making the patient drink largely of warm water. Means should also be employed to arouse the patient and prevent him or her sleeping. This is best done by walking the patient about, slapping the surface of the body, and, if he or she should be insensible, or too drowsy to move about, the galvanic battery ought to be applied to different parts of the body, and counter-irritation, by means of mustard or other blisters, exercised on the lower extremities. If the patient is able to swallow, strong coffee may be usefully administered after the stomach has been thoroughly cleaned out; and if he or she is very weak, small doses of stimulants may be given.

Alcohol.—Patients labouring under the effects of an overdose of alcohol are also brought to hospitals, and require to be treated on the same principles as those recommended in opium poisoning.

Oxalic Acid and Mineral Acids.—The treatment of cases of poisoning with these acids is, to administer solutions of magnesia or chalk in milk, and to make the patient drink demulcent fluids freely.

Prussic Acid, Arsenic, and Strychnine.—These substances, when taken in large doses, usually prove very speedily fatal, and, therefore, such cases of poisoning admit of little treatment. All that can be done is to get the stomach emptied by means of an emetic, and stimulate the surface of the body by cold effusion or friction.

Alkalis.—The treatment of poisoning by these substances is, to administer vinegar diluted with water and some kind of sweet oil.

Corrosive Sublimate.—The treatment of cases in which this poison has been swallowed is, to administer the white of eggs and milk or gluten.

GRANULATING WOUNDS, AND THEIR TREATMENT.

If the edges of a wound do not heal by first intention, or if portions of the skin or other soft textures are destroyed by disease, or separated by injury, a granulating surface or surfaces is the result, for it is by means of granulations that such wounds or sores heal. The house-surgeon or dresser is, therefore, constantly called upon to treat granulating surfaces, which may be in a healthy condition, or which may, from some local or constitutional cause, be in an abnormal state. The numerous sores and ulcers which come under the notice of the surgeon are merely unhealthy conditions of granulating surfaces.

Treatment.—The treatment of a healthy granulating wound consists in keeping its edges clean, and applying simple water-dressing; or, if this dressing irritates the skin, dry or greasy dressing may be used. The dressing should be so applied, that the discharge coming from the surface of the wound will get ready exit. The surface of a healthy granulating sore should not be washed, or otherwise interfered with. If two granulating surfaces be brought together, and retained in apposition, they will unite; and, therefore, when their union is desirable, they should be kept in contact by means of sticking-plaister or bandaging. Occasionally, sutures may be employed for this purpose. Cases of harelip, which have not united by first intention, may sometimes be got to unite in this way. It not unfrequently happens, especially after burns, that the granulations rise up above the level of the surrounding parts, and prevent the proper healing of the wound or sore. Such exuberant granulations are popularly termed "proud flesh." The best treatment for reducing these granulations is, the application of pressure to them, or the employment of astringents or caustics. If these means fail, the granulations may be shaved off with a sharp knife. Pressure may be applied in the form of a pad of dry lint, or a piece of thin sheet-lead, cut to the size of the wound, and retained on it by means of a bandage. Solutions of sulphate of zinc or sulphate of copper, or the solid sulphate of copper or nitrate of silver, may also be employed to destroy or diminish granulations which are too excessive. It often happens, during the healing of a large granulating sore, that after a time the granulations become feeble and pale, and the healing action goes on very slowly. When this takes place, it is necessary to apply some slight stimulant, in the form of the "red" or "blue" lotion. By alternating these lotions with one another, and with water-dressing, a beneficial effect is often best produced.

The proper treatment of the various ulcers will be found in any practical work on surgery. Many of the patients suffering from ulcers of the legs who apply for advice, and who cannot be admitted into hospital, will be best relieved by the application of strapping (either sticking-plaister or wet strips of linen), and a carefully-adjusted bandage to the affected limb or limbs.

ERYTHEMA, ERYSIPELAS, SLOUGHING AND HOSPITAL GANGRENE, PYŒMIA, AND TETANUS.

Erythema.—This affection occasionally attacks some part of the margin of a wound, and may confine itself to the neighbourhood of the wound, or wander more or less over the body generally in the form of patches. This affection causes slight swelling and tenderness of the skin, but is not of such a bright red colour, and does not spread regularly as erysipelas. There may be considerable fever and constitutional disturbance as a result of erythema, which in most cases subside in a few days. Erythema is best treated by administering some saline, combined with a diaphoretic and anodyne. Such a mixture as the following answers very well:—

℞	Vini antimonialis, . .	℥ss.
	Sol. mur. morphiæ, . .	ʒiii.
	Misturæ camph., . .	℥vi.

Twenty to thirty drops to be taken in water every two or three hours.

If there is much local uneasiness, hot fomentations or poultices should be applied over the wound, and the affected surface dusted with flour or other cooling powder.

Erysipelas.—The simple form of erysipelas frequently attacks wounds, especially those of the scalp and neighbourhood, and gives rise to constitutional disturbance, which varies in intensity in different people, as well as local uneasiness and an unhealthy condition of the surface of the wound. When the wound is situated on the head, the face may become much swelled, the features obscured, and the glands of the neck painful and enlarged. When this affection attacks the margin of a wound, it generally spreads rapidly in all directions, or affects separate portions of the skin, which portions soon join with one another so as to form one continuous surface, the patches first attacked becoming paler in colour as the disease advances. The treatment of simple erysipelas should be conducted according to the state of the patient. If the patient be healthy and strong, the saline and diaphoretic mixture recommended in erythema should be given until the acute symptoms disappear, and then the tincture of the muriate of iron administered in doses of twenty or thirty drops three times a-day. All stimulating food or drink should be, in the first instance, avoided, and the ward or apartment in which the patient is kept well ventilated. When, however, the patient has been enfeebled by disease or dissipation, it is generally advisable to treat him or her by giving stimulants and iron from the first. The local treatment is the same as that of erythema. If small abscesses form, they must be opened. Phlegmonous erysipelas also follows wounds and other injuries, and requires early treatment, for it speedily leads to destruction of tissue and diffuse suppuration if proper means be not used to stay its progress. This affection is often accompanied by severe constitutional irritation, with delirium and other serious symptoms. The treatment consists in making free incisions down into the areolar tissue, which is the seat of the inflammation, giving the patient stimulants, tonics, and nutrient diet to support his strength, and applying fomentations or poultices until the sloughs separate.

Sloughing and Hospital Gangrene.—When patients have been in an hospital for some time, their wounds or sores occasionally put on an unhealthy appearance and action. This condition is usually owing to some temporary derangement of the health, produced by the confinement or other cause, and is in most cases checked by sending the patient home, so that he may have change of air (in some cases it is sufficient to change the patient's ward), and correcting any bad state of the health by proper constitutional remedies. It is not uncommon for more or less of the edges of wounds to slough as a result of injury or inflammation; but in such cases the death of tissue is usually limited, and does not spread. The treatment for such sloughing consists in applying a poultice or warm-water dressing until the dead parts separate, and then treating the granulating surface left in the usual way.

Wounds and sores are, however, liable to be affected with sloughing phagedæna, or hospital gangrene—a much more serious condition—especially when a number of patients are congregated together. When this sloughing phagedæna attacks a wound or sore, it speedily enlarges it by destroying the surrounding tissues, so that in a very few days such a wound will have increased to five or six times its original size. In addition, this affection is always accompanied by constitutional disturbance, which may be very severe if the affected surface is extensive, or if the disease is very rapid in its progress. The first local symptom of this condition is usually more or less swelling and inflammation of the parts around the wound. The edges and surface of the wound then soon present the appearance of sloughing or ragged ulceration, or both; and these processes rapidly spread if not checked, destroying the tissues in their progress. The disease is apt to occur epidemically in some hospitals, and when it has attacked one patient, it frequently attacks also the wounds of the other patients, no matter how trivial they may be. When one or more wards of an hospital are thus affected, operations even of the slightest nature cannot with safety be performed, owing to the risk that there is of the wounds becoming attacked.

Treatment.—If an isolated case occurs, the affected patient should be at once removed from the ward, or all the other patients should be taken away. The infected ward must be well ventilated, and disinfectants freely used in it. All dressings removed from the infected wound or wounds should be immediately taken away and destroyed, so that they will not come in contact, directly or indirectly, with the wounds of the other patients. If it be possible, the house-surgeon or dresser who has charge of the affected case should not touch other healthy wounds in the hospital. If he is obliged to do this, he should take special care to wash his hands carefully with some disinfectant before handling the other wounds. The local treatment consists in drying the affected sore thoroughly, and then freely applying strong nitric acid to its whole surface and margins. A poultice, with which charcoal may be mixed, should then be applied, until the sloughs separate. If one application of the acid does not check the progress of the disease, it must be repeated. If the patient is sensitive, and the affected surface large, he should be chloroformed. If the sloughing be in the situation of large blood-vessels, precautions must be taken to stay hæmorrhage, in case these vessels should become implicated. The patient's strength must be supported by nutritious food, stimulants, and tonics.

Pyœmia.—This affection, which proves so fatal after surgical operations and injuries, may follow any injury or surgical operation. It appears especially liable to attack patients who have been weakened from loss of blood or other causes, or who have lived intemperate lives. An unhealthy atmosphere also predisposes to this disease. The first symptom of pyœmia is usually one or more rigors, which are soon followed by restlessness, quick pulse, furred tongue, anxious expression, profuse perspiration, which has generally a characteristic sour smell, delirium, and death. The skin frequently has a jaundiced appearance, and any action in the wound is generally stayed. This is the progress of an acute case of pyœmia, which may prove fatal in two, three, or four days after the first rigor. In more chronic cases the patient may live for several weeks, and, in a few instances, recovery has taken place; but this latter result is rare. In the chronic cases the secondary affections of pyœmia have time to develope themselves, so that patients may suffer from implication of the internal viscera, from effusions into or suppuration of the joints, or from suppuration of the soft textures.

Treatment.—Soothing and disinfectant applications to the wound or sore. The constitutional treatment should at first consist of the careful administration of purgatives (the saline purgatives are the best), if the bowels are confined.

Opium should then be freely given, if there is much restlessness, and the patient's strength diligently supported by stimulants, tonics, and nutritious food. Suppurations in the soft tissues and joints must be treated by incisions in the usual way, and by local soothing applications.

Tetanus.—Traumatic tetanus may follow any abrasion, wound, or injury. It is most frequently met with in hospital practice, as a result of lacerated wounds or other injuries of the extremities, burns, and surgical operations. The symptoms of tetanus are a stiffness or uneasiness in the muscles of the lower jaw and back of the neck (this symptom is often, at first, thought by the patient to depend on a simple cold), pain below the sternum, and, as the disease goes on, locking of the jaw takes place ("trismus"). Certain muscles of the back or abdomen become contracted and rigid, causing the body to be bent backwards or forwards. The muscles, both on the anterior and posterior aspects of the neck, contract spasmodically, especially when the patient makes any attempt to swallow. Other muscles of the body become contracted and rigid. The muscles of the face are sometimes affected, and cause distortion of the features. The bowels are, in most cases, constipated, and, occasionally, retention of urine exists. The patient may have occasional moments of rest from the spasms of the neck; but the slightest attempt to swallow, or any movement, may bring them back again, until the patient dies during one of the spasms, or gradually sinks from exhaustion. The largest number of cases of tetanus occur within two or three weeks after the injury or surgical operation. Cases have, however, occurred after this period.

Treatment.—Remove any local cause of irritation as soon as possible, and apply soothing applications to the wound. Amputation of an injured finger, toe, or limb is advisable in some instances, in order to endeavour to get rid of a local irritation. Relieve the constipation, by administering a drop or two of croton oil, and give morphia or other sedative freely, so as to produce and keep up its full action on the system. If the spasms are very severe, the patient may be made to inhale chloroform, not only to relieve this symptom, but also to prevent its recurring. When the patient survives more than a few days, it will be necessary to support his strength by nourishing diet and stimulants.

Delirium Tremens.—Patients who have led dissipated or irregular lives, are not unfrequently attacked with delirium tremens when they sustain an injury, or undergo a surgical operation. These cases must not be confounded with delirium depending on other causes. Patients who are attacked with this affection, and who are restless, usually require some restraint, as they are apt to displace dressings and other appliances, or aggravate the injuries from which they are suffering. In hospital practice, it is more convenient to remove the patient to the ward set apart for the treatment of such cases, or to some small ward where he will not disturb the other inmates. Opium and other remedies must then be administered, to subdue the excitement of the disease. The majority of such cases are best treated by opium alone, and avoidance of all stimulants; but there are some cases in which, owing to the patient's weakness and exhaustion, it is necessary to give stimulants in addition to opium. When it is desired to restrain a patient's struggles in this or other forms of delirium, a "straight jacket" is generally used. This appliance is nothing more than a shirt made of some strong material, and with long arms. The shirt is placed on the patient in the usual way, the arms of it being drawn over the hands, and tied round with a piece of strong cord or bandage, the ends of which should then be secured to the sides of the bed. By this means the patient's hands are rendered quite secure. It is only then necessary to fasten the patient's feet to the bottom of the bed, and, if advisable, to pass a broad belt or strap round his body, attaching it to the bed, or some fixed object near.

HÆMORRHAGE.

Bleeding may be the result of a wound or other injury, or it may depend upon some constitutional cause. Blood may flow externally, as in the case of a wound, or it may be extravasated into the tissues of the body, or into some of its cavities. Bleeding also takes place from mucous or serous membranes, with or without abrasion of their surface. Hæmorrhage may be arterial or venous, but unless an artery or vein alone is wounded, the blood which flows from a wound of the soft textures is usually partly venous and partly arterial, the latter generally predominating. If an artery or vein of large size be wounded, the bleeding will be either arterial or venous accordingly. When arterial bleeding takes place from a wound, the blood is usually forced out more or less in jets corresponding to the pulsations of the artery. The blood itself is of a bright scarlet colour, and when pressure is made upon the trunk of the vessel between the wound and the heart, the bleeding is stayed. When a vein is wounded, the blood is dark in colour, and issues out in a continuous flow or stream. When pressure is made upon the trunk of the vein between the wound and the heart, the bleeding is not stayed but increased. In general terms it may be stated, that when it is necessary temporarily to stay arterial bleeding, pressure must be made upon some part of the trunk of the artery between the wound and the heart, provided pressure cannot be applied directly to the wound in the vessel itself; but in order temporarily to stay venous bleeding, the pressure must be applied upon the wounded portion of the vein.

Bleeding from Wounds.—Wounds, the result of injury or surgical operation, bleed more or less according to the vascularity of the tissues wounded, and the number and size of the blood-vessels divided. If the vessels wounded be small, the bleeding usually soon ceases, provided there be no constitutional or local cause to keep up the hæmorrhage, by placing the part at rest, and if need be, applying a little cold water. When even small arteries continue to throw out jets of blood, or to "spout," as it is generally termed, they keep up the bleeding, and must therefore be secured by the ligature, or if very small, their extremities may be twisted with a pair of forceps. Closing the edges of the wound, and holding them in contact for a minute or two, is also a good method to stay bleeding which is coming from a number of very minute vessels. When the bleeding is coming from a large artery or its branches, the vessel or vessels must be at once tied, for the bleeding from such a wound may be serious. Although bleeding from a wound may have entirely ceased, it sometimes happens that it returns a few hours after, when reaction has taken place, and when the patient's circulation becomes more active. This bleeding is usually termed "reactionary," or "intermediary." When bleeding comes on some days or weeks after the wound or injury has been inflicted, it usually depends upon a diseased condition of the walls of the vessel, or some excessive or unhealthy action, which has prevented or delayed the proper obstruction of the wounded artery or vein. Such bleeding is termed "secondary."

When a patient has lost a large quantity of blood, faintness and collapse usually result. The amount of blood that may be lost, before this condition is produced, varies in different persons, and is also somewhat influenced by their position at the time. The state of collapse or faintness favours the coagulation of the blood, and bleeding, even from large vessels, may therefore be temporarily stayed under such circumstances. As soon, however, as the patient begins to recover, the hæmorrhage is apt to return, especially if a large vessel has been wounded.

When the wound is small and punctured in its nature, and implicates an artery or its branch, the blood may be poured into the soft tissues, and give rise to a false aneurism.

Treatment of Hæmorrhage from Wounds.—In the first place, ascertain the nature of the bleeding. If it be merely a general oozing, without any distinct arterial jet or venous flow, keep the part at rest, remove all clots, and apply a piece of lint or rag dipped in cold water. If this does not stop the bleeding, apply a compress of dry lint over the surface of the wound, and keep it in position by means of a bandage. If the bleeding is coming from a cavity or hollow, stuff it with lint, apply a compress over the mouth of the wound, and secure it with a bandage. Should the bleeding be coming from the surface of a wound which cannot be thus treated, a piece of lint dipped in some styptic, such as the tincture of muriate of iron, or infusion of matico, should be applied to it. When a distinct jet or jets can be seen in a wound, the wounded artery or arteries should be seized and tied. When a vein is wounded, the bleeding is usually readily arrested by applying a compress over the wound and raising the limb; but, if this is not effectual, the vein may be seized and tied like an artery. If an artery has been completely divided, ligatures should be carefully applied to both the divided ends, and, when an artery is simply wounded, a ligature must be tied round the vessel both above and below the wound, the wound in the soft textures being enlarged, if necessary, in order to accomplish this. In wounds of the hand or foot, where an artery is divided, a small firm compress of lint should be placed immediately over the wound in the vessel, and then one or more additional compresses on the top of this, the whole being secured in position by means of a bandage firmly applied. In applying the first compress, care should be taken to place it accurately on the wounded vessel, otherwise it will be of little use. In cases where the divided ends of an artery have retracted, and cannot be seized, a needle or needles may be introduced, in the form of acu-pressure, so as to compress the vessel and stay the bleeding. In treating all cases of bleeding, the patient should be kept cool and quiet, and not allowed to take warm or stimulating food or drink. If the patient is restless or uneasy, opium or other sedatives should be administered.

Intermediary hæmorrhage must be treated by removing the dressings, taking away all clots, and applying cold, and, if any arteries spout, they should be tied. If there are sutures keeping the edges of the wound together, they ought to be divided, all clots removed, and any jetting vessels tied. If oozing still continues, it will be better to leave the wound open, and apply cold for an hour or two, until the bleeding ceases, when the edges of the wound may be brought together again by sutures or strips of sticking-plaister.

Secondary hæmorrhage must be treated according to the cause producing it. If an artery has given way or has been opened by unhealthy ulceration or sloughing, it will be necessary to secure it at once in the same manner as a wounded artery; but it not unfrequently happens that, owing to the diseased state of the artery or tissues round it, the application of a ligature is not satisfactory. In such cases pressure must be tried, and if this fails, it will be necessary either to tie the trunk of the artery higher up, or to perform amputation, if the case admits of it.

In all cases of profuse arterial bleeding, it is of great consequence to stay the hæmorrhage immediately, and this is best done temporarily by the application of pressure to the trunk of the vessel, at some convenient point between the heart and the injury. This pressure may be applied either by means of the fingers or with a tourniquet, until the wounded vessel is secured, or other means employed for staying the hæmorrhage. When a patient has lost a considerable quantity of blood, and is in consequence faint, it is better not to attempt to arouse him until the bleeding point has been secured.

Hæmorrhagic Diathesis.—Wounds inflicted upon a certain class of patients bleed freely and continuously. Even a slight scratch or cut in such patients may give rise to prolonged and serious hæmorrhage. The bleeding in cases of hæmorrhagic diathesis is in the form of a general oozing from the surface or surfaces of the wound, which often, in spite of treatment, continues until the patient becomes weak and exhausted, or dies in consequence. In my own experience of this bleeding, I have found that, in the majority of instances, the blood continues to flow until the patient becomes weakened from the loss of blood, when nature appears gradually to stay the hæmorrhage spontaneously.

The treatment of this kind of hæmorrhage consists in bringing the edges of the wound closely in contact by means of fine pins or needles, if this be possible, or if this cannot be done, steady and firm pressure must be made on the wound. Styptics should also be tried if pressure alone fails. The patient should be kept cool and quiet; and if he is restless, opiates ought to be given. Sucking ice, or drinking iced water or milk, is often also both grateful and useful in these cases. There are certain drugs which, when taken internally, are supposed to exercise an effect in staying local hæmorrhages; but with the exception of opium, I have little faith in the use of these.

Bleeding from Ulcerated Surfaces.—The ulcerated surfaces of malignant or other tumours occasionally bleed very freely. Such cases must be treated by the pressure of pads of dry lint, or by the application of styptics; and if the part cannot be thus treated, by the application of the actual cautery. Varicose veins of the leg occasionally give rise to ulceration of the skin, and in consequence such veins may give way, and a serious or even fatal venous hæmorrhage result. These cases are to be treated by applying a pad over the ruptured point of the vein, and securing it firmly in position by means of a bandage, the patient at the same time being kept in the horizontal position with the limb raised.

The after-treatment of all cases of severe hæmorrhage will consist in giving the patient nutritious diet, stimulants, and tonics—of which the preparations of iron are generally the best.

Bleeding into the Tissues and Cavities.—Blood may be poured out into the tissues of the body, as a result of the rupture of one or more small vessels, or of the rupture or wound of a large artery. In the former instance, more or less ecchymosis is the result; in the latter, a false aneurism is very apt to form. The treatment in simple cases of ecchymosis is merely that which has been recommended in bruises. When a large artery has been ruptured or wounded, an operation for securing it above and below the injury will be necessary.

When blood is poured into the cavities of the cranium, chest, abdomen, pelvis, or joints, the first thing to be done is to ascertain the source of the hæmorrhage, if there is an external wound. If the bleeding is coming from the superficial parts, means should be used to arrest it, the wound being kept open and dilated if necessary. When the bleeding is from the cavity itself, all we can do is to keep the patient at rest, give opium, and endeavour, by the application of cold externally, to stay the internal bleeding.

Bleeding from Mucous Surfaces.—When a mucous surface is wounded, it may bleed more or less according to the depth of the wound and vascularity of the part. Hæmorrhage may also take place from an unbroken mucous surface. The treatment of these cases is to apply pressure, by means of lint, and if this fails, to use styptics or the actual cautery.

Epistaxis.—This term is applied to bleeding from the nose, which may be the result of injury or a surgical operation, or may be caused by congestion of the parts dependent on the patient's constitution or state of health.

The treatment of bleeding from the nose is to keep the patient quiet and cool, and to apply cold to the face and head. If this does not stay the bleeding, plug one or both nostrils. If the bleeding depends upon a wound near the anterior nares, it will generally be sufficient to stuff the nostril with a little lint introduced through the anterior nares, but when the bleeding is coming from behind, or from a considerable surface, it becomes necessary to plug both the anterior and posterior nares.

Plugging the Nostril.—In order to plug the posterior nares, an elastic catheter should be prepared by fastening to its point a small loop of thread or silk. A firm compress of lint, rather less than an inch square, should also be made, and firmly secured to the centre of a piece of strong silk, about eighteen inches in length. The catheter is then to be introduced through one nostril, and passed along the floor of the nasal cavity until it protrudes behind the soft palate. Its end must be seized with the fingers or a pair of forceps, and brought into the mouth, one end of the silk to which the compress is secured is then to be fastened to the loop at the extremity of the catheter, and the instrument drawn back through the nostril, bringing along with it the silk, this silk being laid hold of, as shown in fig. 39, taken from Liston, the compress can

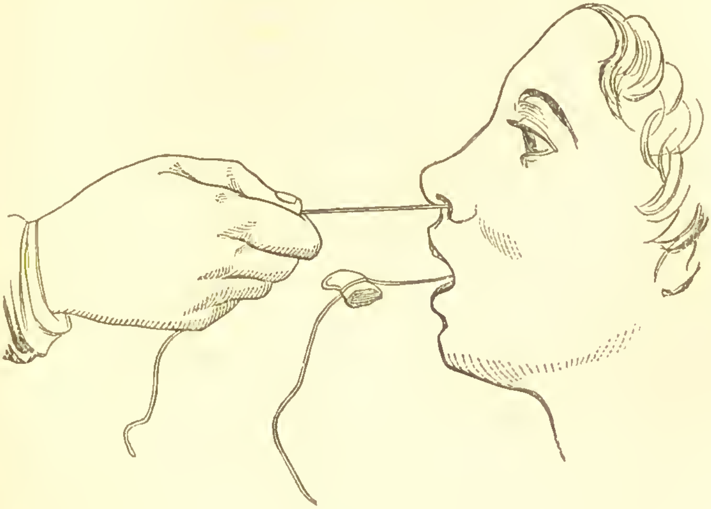

Fig. 39.

be gradually drawn into the posterior nares by means of it. It is well to guide the compress with one finger behind the soft palate, as it is apt to be caught at this point. When the compress has been drawn into position, the two ends of the thread (the one hanging out of the mouth and the other out of the nostril), are to be tied together at the corner of the mouth, and secured on the cheek by a strip of plaister. A little lint may now be introduced into the anterior nares if necessary. If both nostrils require to be plugged, two separate plugs and threads must be prepared, each being passed in the way just described. When it is desired to remove the plug, untie the two ends of the silk, and then by pulling at the one protruding from the mouth, the plug will readily be drawn out.

Bleeding from the Urethra and Bladder.—Hæmorrhage may take place from some portion of the urethra or bladder, as a result of injury or disease, and may either flow out externally, or pass into the cavity of the bladder, distending it, and giving rise to symptoms of retention. Occasionally also the kidneys or ureter may be the source of the blood, which passes into the bladder.

Treatment.—Apply cold over the urethra or bladder. If the hæmorrhage be coming from the latter organ, keep the patient quiet, and administer opium or other sedatives. When blood accumulates in the bladder, experience has shown that it is better not to interfere with it, but to allow it to soften and come away by the urethra, unless complete retention exists, when a large catheter should be introduced, and the blood drawn off by means of a syringe or pump attached to its orifice. When bleeding follows, the operation of lithotomy or other operations in connection with the urethra, it should be treated by raising the patient's buttocks, and plugging the wound with lint. If there is a catheter or tube in the wound, the lint should be introduced all round it, so as firmly to compress the whole surface of the wound. The application of cold will sometimes be sufficient to stay the bleeding. If any superficial arteries spout, they should be tied.

Bleeding from the Vagina and Rectum.—Bleeding may take place from either of these canals, as a result of injury, surgical operations, or disease. If the hæmorrhage depends upon a wound or ulcerated surface, cold water should be injected, or the canal stuffed with lint; and if these means fail, some styptic application may be used. When the bleeding depends upon the presence of some vascular or other tumour, the only satisfactory treatment will be to remove or destroy the cause.

DIGITAL PRESSURE AND TOURNIQUETS.

The trunk of an artery may be temporarily compressed, either by means of the fingers and thumb, or by means of tourniquets. Digital compression can, with a few exceptions, only be successfully employed in those situations where there is a bone against which the artery can be compressed. In employing digital compression, it is not usually necessary to press so very firmly with the fingers as is generally imagined. If the fingers or thumb be placed accurately over the vessel, and steady pressure made, this will usually be sufficient. The arteries which can be compressed in this way are (1), The facial, which may be compressed as it passes over the lower jaw; (2), The temporal, as it passes up the temple; (3), The carotids may be compressed against the vertebræ, care being taken not to press upon the larynx or trachea; (4), The subclavian

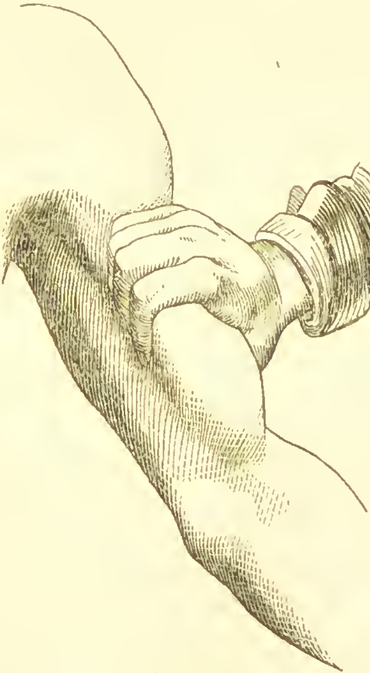

Fig. 40.

against the first rib; (5), The brachial against the humerus, at the situation shown in fig. 40, taken from Fergusson's Surgery, or in any other part of its course; (6), The radial and ulnar against their corresponding bones, at the middle and lower thirds of the fore-arm; (7), The abdominal aorta against the vertebræ; (8), The femoral against the brim of the pelvis, as shown in fig. 41, which is also taken from Fergusson; (9), The anterior and posterior tibial may be compressed at the ankle, the former against the anterior aspect of the tibia, the latter against the internal maleolus.

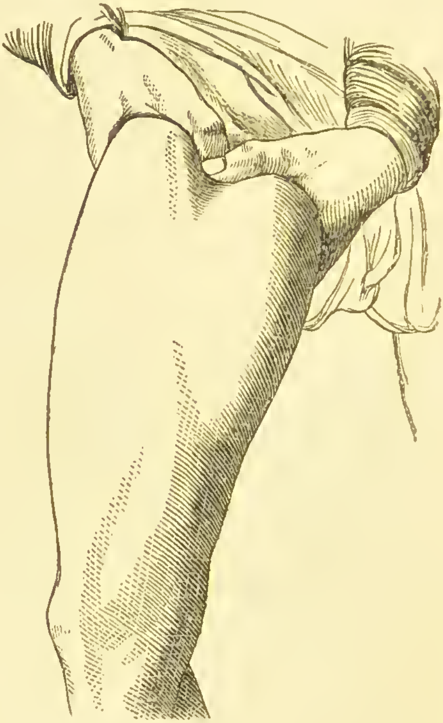

Fig. 41.

When sufficient assistance is not at hand, or when it is necessary to keep up the pressure on the artery for some time, it is advisable to employ a tourniquet. The only objection to the use of this appliance is, that you cannot press upon the artery without also pressing more or less upon the veins, so that congestion of the limb is produced; and if there is a wound, venous bleeding may be encouraged, but still this evil is not likely to be so serious as the hæmorrhage from a large artery. Tourniquets vary somewhat in their nature. The simplest form in most common use is that which consists of a band of strong cloth, fitted with a buckle, and connected to a brass body and screw, by means of which it can be tightened or slackened. This tourniquet is generally applied to three situations,—namely, the thigh, popliteal space, and

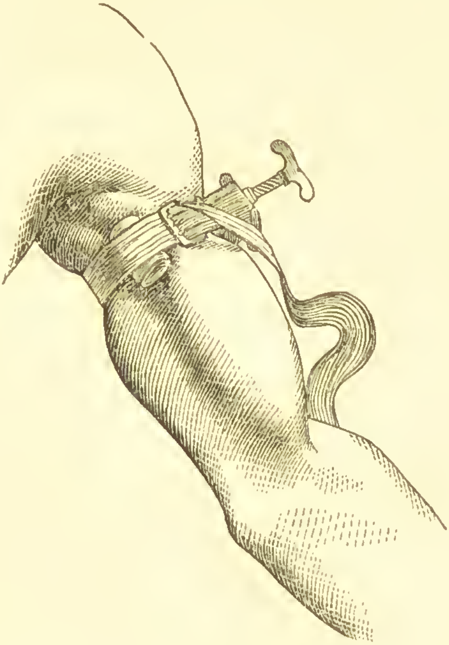

Fig. 42.

arm. The application of it to the first and last is illustrated in figs. 42, 43, which are taken from Fergusson. In applying this instrument, a firmly-rolled bandage should first be placed over the artery, and it is better to secure it there by allowing it to take one turn round the limb. The strap of the tourniquet should now be passed round the limb, over the roller or pad (which ought to be held in its proper position while the instrument is being adjusted), and fastened tightly by means of its buckle. Then, by turning round the handle of the screw, the necessary compression can be made, so as entirely to stay

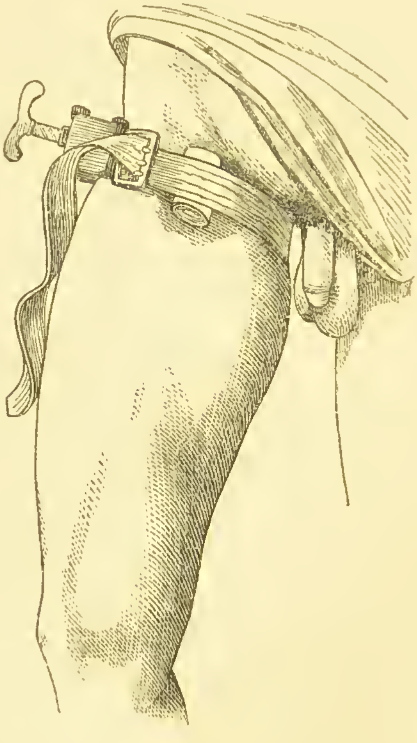

Fig. 43.

all circulation in the vessel. It should always be seen that the screw of the tourniquet is well screwed down before the instrument is used. The body of the tourniquet may be adjusted, either over the roller or pad, or on one side of the limb, whichever is most convenient. In the thigh, the body of the instrument may either be placed at the outside of the limb, as shown in fig. 43, or upon the top of the roller itself. In the arm, it is most convenient to have the body of the tourniquet on the outside of the limb. When the popliteal artery is compressed, the roller should rest in the popliteal space, and the body of the tourniquet immediately above the patella.

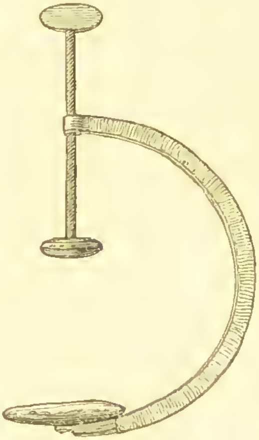

Fig. 44.

If a common tourniquet is not at hand, a temporary one may be made with a piece of rope, handkerchief, or bandage, and a rounded stone or other hard substance for a pad. The rope or other band having been fastened round the limb, over the stone or other pad, should be tightened by inserting a piece of stick through the loop, and then twisting it round.

The other kinds of the tourniquet used in surgical practice are made in the form of a circle or semi-circle of steel, which has connected to it a fixed pad below and a movable pad above, attached to a screw, so that it can be worked up or down.

It is on this principle that Professor Lister's tourniquet for compressing the abdominal aorta is constructed. The original instrument is illustrated by fig. 44.* In applying this tourniquet, it should be passed round one side of the abdomen immediately above the crests of the ilia, and adjusted, so that the fixed pad below rests on the spines of the vertebræ. The exact position of the artery having then been determined by feeling its pulsation, the upper pad should be screwed down upon it until all pulsation has ceased in the femoral vessels.

If this instrument is properly applied, its use will be found invaluable in amputations at the hip-joint, and through the upper part of the thigh, and in operations implicating the large arteries of the pelvis or lower extremity.

DISLOCATIONS.

These accidents are of frequent occurrence in surgical practice, and their proper diagnosis and treatment are therefore of importance. Dislocations are usually divided into simple and compound, the former of which are much the more common. These injuries are occasionally also complicated with fracture of the bones, or rupture of important blood-vessels or nerves. Dislocations should always be reduced as soon as possible after the injury has been sustained. A simple dislocation is diagnosed by the displacement of the articular surfaces, which causes more or less deformity, by the interference with the mobility of the joint, by the absence of all true crepitation, and by the alteration in the length and position of the limb. The reduction of dislocations may be effected by simple manipulation in some instances; but in the majority of cases it is necessary to employ extension and counter-extension, in order to return the displaced bone or bones to their proper position. Chloroform is a great assistance in treating these injuries, and should always be used if there is any difficulty in accomplishing their reduction. When chloroform is employed for this purpose, the patient should be placed fully under its influence, in order to relax the muscular tissues as much as possible. In reducing old-standing dislocations, placing the patient previously in a warm bath is sometimes a useful adjunct to the chloroform in relaxing the muscular and other tissues.

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* I understand that M. Lister is at present engaged in making some alterations in the construction of this instrument.

Extension and counter-extension may be made with the hands, and a foot or knee, as in reducing dislocations of the shoulder; but in dislocations of the larger joints, or in those which have resisted milder measures, some apparatus is usually required for laying hold of the limb in order that it may be more thoroughly extended. The best appliance for taking firm hold of a limb is a hank of thick worsted, used in the form of the clove hitch. As there is often considerable confusion in making this kind of knot, I have given an illustration of it in fig. 45. Two loops are to be made, as shown in the illustration, and then the one marked A is to be brought in front of that marked B. The limb is now to be passed through both loops, which, when tightened, will be found to grasp it firmly. If it is advisable to make this knot still more secure, a

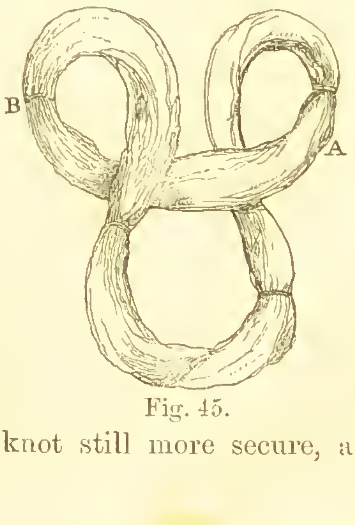

Fig. 45.

few turns of a damped roller may be applied round it and the limb. Fig. 46 shows the method of applying the clove-hitch to a limb, and making extension by means of it. When still greater extension is

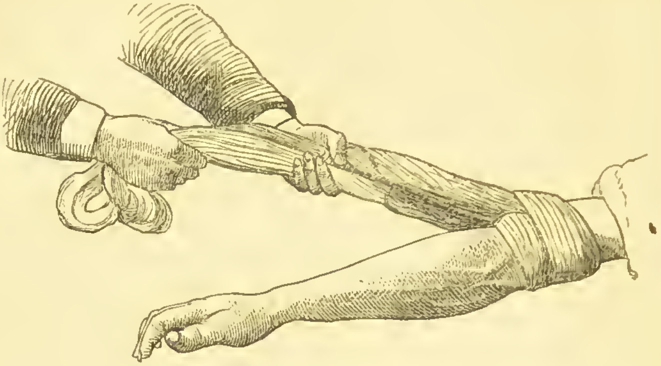

Fig. 46.

required, the pulleys must be employed. In using the pulleys, one end of the dislocated joint requires to be fixed by a belt or other apparatus, and then extension made by attaching the hook at one end of the pulley to a loop of worsted which has been applied in a clove-hitch to the injured limb, the other hook of the pulley being at the same time connected to a fixed cord or belt. When the various parts of the apparatus have been adjusted, the rope of the pulleys is to be slowly and steadily pulled, the amount and direction of the extension being carefully watched until the requisite effect has been produced. When the dislocation is compound, it is in most cases necessary to remove a portion of the displaced bone or bones, or, if there should be other severe injuries, to perform amputation. If a bone be simply fractured as well as dislocated, splints should first be applied to the fracture, and then the dislocation reduced by the ordinary method. Attempts may be made to reduce dislocations some time after the injury. Such attempts may be made up to the sixth week in dislocation of the upper extremity, and up to the eighth or ninth week in those of the lower extremity. In young people, the time after the accident at which a dislocation can be reduced is not so long as in older persons. The ball-and-socket joints may also be reduced at a longer interval than the hinge joints. Exceptional cases may occur, in which it is right to attempt reduction at periods later than have been mentioned; and again, other cases are met with in which the dislocation does not admit of reduction even before the end of these intervals. After a dislocated joint has been reduced, it should be kept at rest for a week or two, and if much pain and swelling follow the injury, warm fomentations should be used.

Lower Jaw.—The lower jaw may be dislocated on both sides, or on one side only; the former is the more common.

Symptoms.—The mouth is open, the jaw fixed and slightly projecting, and the patient is unable to articulate. When only one side is dislocated, the symptoms are much the same, only the incisor teeth will be directed to one side or other.

Reduction.—Take a firm hold of the lower jaw with both hands, as shown in fig. 47, one thumb being placed inside the mouth over the molars on each side, the fingers remaining outside, and grasping the bone near its angle. It is best to place the corner of a towel, or some soft substance, between the teeth and the thumbs. When the jaw has been firmly laid hold of, its angles must be drawn well downwards, and then carried backwards, so as to return the condyles to their proper position. When a case is obstinate, reduction may sometimes be accomplished by first acting in the way just described on one side, so as to reduce it, and then acting similarly on the other. Chloroform is not usually necessary in reducing this dislocation, but it should be given if the bone cannot be returned without it.

Clavicle.—This bone may be dislocated at its acromial or sternal ends. The former is much the most frequent. The acromial end is usually dislocated upwards.

Symptoms and Treatment.—The acromial end can be seen and felt raised up from its usual position.

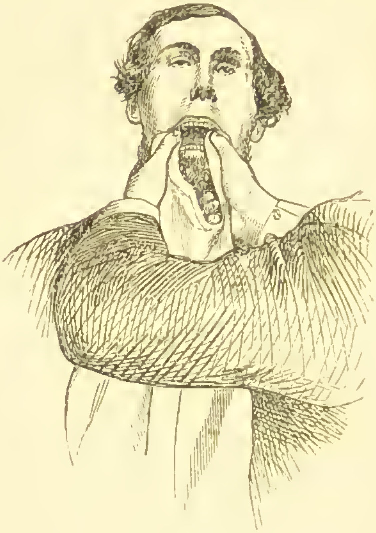

Fig. 47.

The shoulder is generally slightly depressed, and there is in most cases some inability to raise the arm. This dislocation is to be reduced by drawing back the shoulders, and applying a pad firmly over the displaced bone, by means of the figure-of-eight bandage. illustrated at A, fig. 17. The sternal end of this bone is usually displaced forwards or backwards, and the dislocation is easily detected, as the bone can be felt in its unnatural position. There is generally also some shortening of the distance between the shoulder and sternum. The treatment of this dislocation is not usually successful, but endeavours may be made to reduce it by drawing back the shoulders, and by applying a bandage to keep the bone in its proper place.

Shoulder-Joint.—The head of the humerus may be dislocated *downwards*, *forwards*, and *backwards*. The first is the one generally met with.

Symptoms.—Flattening of the shoulder, and a hollow immediately beneath the acromion caused by the absence of the usual prominence of the head of the bone. The elbow is usually separated from the side, and cannot be brought close to it unless some force is used. The mobility of the joint is interfered with, and the axis of the arm is changed. The head of the bone can be felt in the axilla, under the coracoid process or clavicle, or on the dorsum of the scapula, according to the direction of the displacement. In the majority of cases, the head of the bone is found in the axilla, or under the coracoid process.

Reduction.—If the dislocation is very recent, movement and manipulation of the arm will sometimes succeed. If this fails, extension and counter-extension of the arm should be made by means of the heel in the axilla, as shown in fig. 48. If more convenient, the clove-hitch may be applied to the arm or wrist, and extension made in the same way with the heel in the axilla. If greater extension is required, an assistant may also lay hold of the end of the clove-hitch, and increase the extending force. If any difficulty is met with in reducing this dislocation, the patient should be placed fully under the influence of chloroform. If the methods already enumerated fail, extension by means of the pulleys must be made. The scapula and body are first to be fixed by means of a belt or band passed under the axilla and over the shoulder, and then the pulleys having been attached to the end of a hank of worsted, applied by means of a clove-hitch to the arm or wrist, the proper extension made, the arm being at the same time rotated and manipulated, in order to return the bone to the glenoid cavity.

When the dislocation is forwards, the extension must be made more or less outwards, and slightly downwards, so as to draw the head of the bone from its abnormal position.

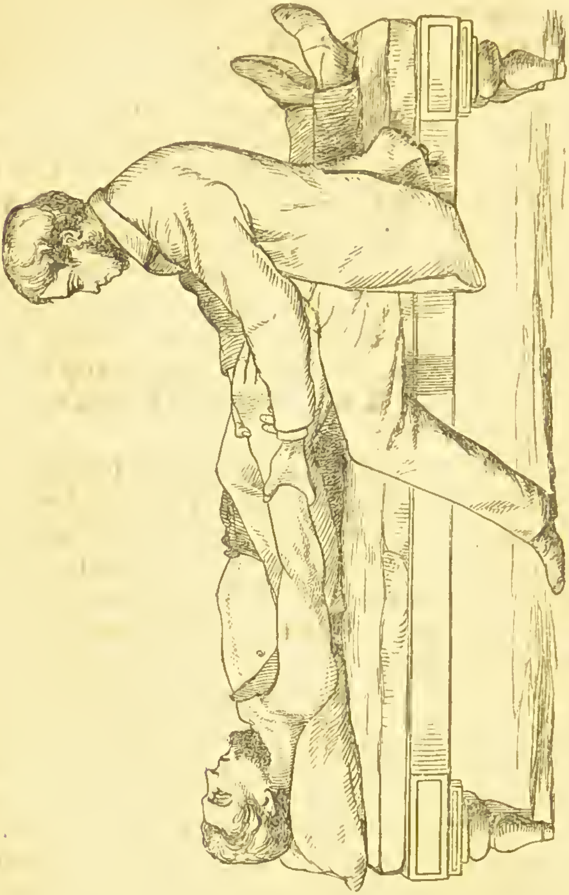

Fig. 48.

In dislocation backwards, the extension should be made downwards and slightly forwards.

Elbow Joint.—Both ulna and radius may be dislocated backwards at this joint.

Symptoms.—Elbow slightly flexed and fixed in that position. Hand usually in a state of moderate pronation. The lower end of the humerus projects in front of the elbow, the olecranon and head of the radius forming a marked prominence behind. (This accident is often simulated by a fracture through the lower end of the humerus). This dislocation is usually reduced by simple extension of the fore-arm, the arm being at the same time fixed; but if this method fails, the dislocated elbow should be placed against the knee of the surgeon, and forcibly flexed against it. This will generally press the bones into their proper position.

Both bones may also be displaced *outwards*, and rarely *inwards*. These dislocations are usually not complete.

Symptoms.—The elbow more or less flexed, fixed, and unnaturally distorted. The inner condyle of the humerus projects inwards, the head of the radius outwards. In dislocation inwards, this displacement is reversed. This dislocation is reduced by extension and pressure on the ends of the displaced bones.

The head of the radius may be dislocated alone, *forwards*, *backwards*, and rarely *outwards*.

Symptoms. — The elbow cannot be extended or flexed, without pain. The fore-arm is usually more or less pronated, and the head of the bone can be felt in its unnatural situation, either in front of the humerus or behind it, as the case may be. These dislocations are reduced by extension and counter-extension of the limb, at the same time pressing the dislocated bone into its proper position.

Wrist Joint.—These accidents are rare, a fracture through the lower end of the radius being the most frequent injury in this situation. The carpal bones are, however, sometimes dislocated *backwards*.

Symptoms.—The displacement of the bones, absence of all crepitus and the deformity, immediately cured when the dislocation is reduced. Reduction is accomplished by extension of the hand, with a slight rotatory movement. The ulna alone is occasionally dislocated backwards at the wrist. The symptoms of this accident are the displacement of the bone, which can be felt on the back of the wrist, and the fixed state of the hand, usually half-way between pronation and supination. Reduction is performed by extension and counter-extension, and supinating the hand to its full extent.

Thumb and Fingers.—The carpo-metacarpal joints are sometimes dislocated *backwards* or *forwards*, the thumb being the digit most frequently injured in this way. The displaced bone can be felt in the majority of cases, and the accident thus diagnosed. Reduction is to be made by manipulation and extension. The metacarpo-phalangeal joints may be dislocated *backwards* or *forwards*. The first of these is the more common, and generally occurs in the thumb. If a thumb is the affected digit, it is usually forced outwards, and forms an angle with the distal extremity of the metacarpal bone, the last phalanx is usually flexed on the first (occasionally it is extended), and the head of the metacarpal bone projects on the palmar surface of the hand.

In the dislocation forwards the thumb is extended, and the head of the metacarpal bone projects on the dorsal surface of the hand.

In dislocations of the fingers at this joint, the displaced bone can generally be felt either on the dorsal or palmar surface of the hand.

Reduction. — Simple extension and manipulation should first be tried. If this does not succeed, lay hold of the digit and forcibly flex it on the palm of the hand, pressure being at the same time made on the head of the dislocated bone. When the end of the phalangeal bone has in this way been brought on a level with the articular surface of the metacarpal bone, the digit should be freely rotated and moved until the bone slips into its proper place. In reducing these dislocations, extension may sometimes be usefully made by applying a piece of bandage or tape to the extremity of the finger or thumb in the form of a clove-hitch.

The phalangeal joints may be displaced *backwards*, *forwards*, or *laterally*. These accidents are not very common, and are generally easily recognised and reduced by simple extension and manipulation.

Hip-Joint.—The head of the femur may be dislocated *upwards*, *backwards*, *downwards*, and *forwards*. The symptoms of a dislocation *upwards* are, shortening of the limb from an inch and a-half to three inches, rotation of the thigh inwards, and slight flexion of it upon the pelvis. The affected knee rests upon the opposite thigh, just above the patella, and the great toe of the dislocated limb rests on the instep of the other foot. The intensity of these symptoms varies somewhat in different cases.

Reduction.—This dislocation and the other dislocations of the hip can sometimes be accomplished by flexing the leg upon the thigh, and the thigh upon the abdomen, and then rotating, and at the same time abducting or adducting the knee according to the direction of the displacement, so as to manipulate the head of the bone into the acetabulum. If manipula-

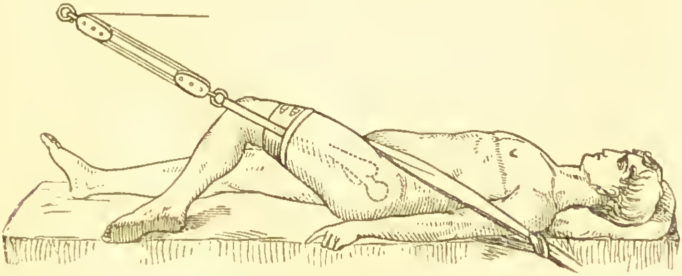

Fig. 49.

tion alone fails to reduce this dislocation, the pulleys must be used, and attached to a clove-hitch which has been adjusted to the lower part of the thigh, or to the ankle. The patient must be laid on his back on a firm mattress placed on the floor, and having been put under the influence of chloroform, a strong belt or

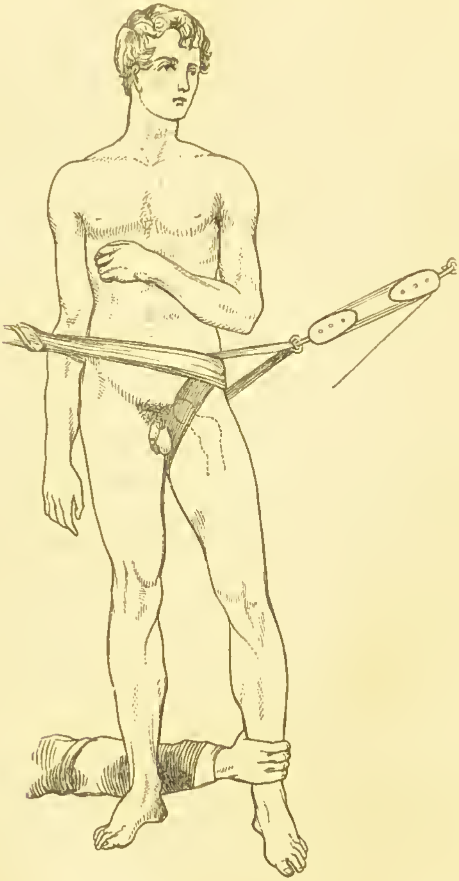

Fig. 50.

sheet is to be passed round the upper and inner side of the dislocated thigh, and its ends brought upwards and connected to some fixed body, in order to steady the pelvis. The extension must then be made across the opposite thigh, so as to draw the head of the bone downwards to the acetabulum. Fig. 49, taken from Cooper, illustrates the reduction of this dislocation. When the bone has reached the margin of the acetabulum, rotation of the limb will generally cause it to slip into its place. If rotation is not effectual, the bone may be lifted into position by means of a towel passed round the upper part of the thigh.

The symptoms of the dislocation *backwards* are, shortening of the limb for about half-an-inch, and rotation inwards, as in the dislocation upwards, but not to such an extent. The dislocated thigh cannot be completely straightened, and in some cases the head of the bone can be felt in the ischiatic notch.

Reduction.—The same as in dislocation upwards, the head of the bone being lifted well up by means of the towel, in order to allow it to pass over the edge of the acetabulum.

In the dislocation *downwards* the limb is lengthened from one to two inches, abducted, and flexed, and the body is bent forwards.

Reduction.—By flexion and manipulation, and, if these fail, by extension made in a direction outwards

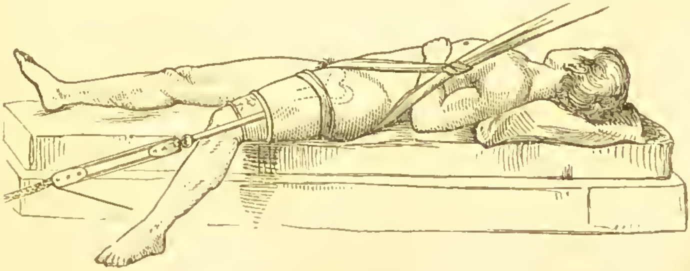

Fig. 51.

and slightly upwards with the pulleys, as shown in fig. 50, from Cooper, the foot being at the same time forcibly abducted and carried underneath the opposite one.

In the dislocation *forwards* the limb is shortened, abducted, and rotated outwards. The head of the bone can be felt lying on or in front of the pubes, and the trochanter major cannot usually be distinguished.

Reduction.—By flexion and manipulation alone, and if these do not succeed, by extension with the pulleys, after the manner shown in fig. 51, taken from Cooper. The direction of the extension should be downwards and backwards, the head of the bone being then lifted into its place with the towel.

Knee-Joint. — The patella is sometimes displaced *laterally*, and is best reduced by straightening the knee, flexing the thigh upon the abdomen, and then pushing the bone into its place.

The head of the tibia may be displaced *backwards*, *forwards*, or *laterally*. These injuries are not common, and are usually readily diagnosed by seeing and feeling the displacement of the bone. Reduction is accomplished by manipulation alone, or by extension with or without the pulleys. The semi-lunar cartilages are sometimes displaced. The symptoms of this injury are, that a patient is suddenly brought to a stand-still, and feels a pain in the joint and inability to move it. Sometimes he may fall in consequence of the injury. Such an accident is diagnosed from a dislocation by the absence of any distinct displacement of the bones. The replacement of these cartilages is easily effected by manipulation and flexion of the joint.

Ankle.—The foot may be displaced *inwards*, *outwards*, *backwards*, or *forwards*. The two former injuries are usually associated with fracture of the lower end of the tibia or fibula, and will be considered under Fractures. The two latter are rare, and are diagnosed by the lengthening or shortening of the foot, and an increase or diminution in the prominence of the heel, according to the direction of the dislocation. The reduction of these injuries is made by flexing the leg upon the thigh, and manipulating or extending the foot into its proper position.

The astragalus is occasionally dislocated. The injury is generally compound, and associated with laceration of the soft textures and protrusion of the bone. In the majority of cases, excision of the bone or amputation of the foot is required.

Tarsus and Phalanges.—The tarsal bones are occasionally dislocated, and are best reduced by manipulation, when the injury is simple, and by excision when it is compound. The meta-tarso-phalangeal and phalangeal joints of the toes are also occasionally dislocated, and require to be reduced on the same principles as the corresponding injuries in the fingers and thumb.

FRACTURES.

Before considering fractures, I wish to make a few general remarks in regard to splints. The application of these appliances will be more particularly described in connection with the different fractures.

The essential qualifications of a splint or other appliance are simplicity and efficiency. In plate 2, I have illustrated the splints which I think will be found sufficient for treating the majority of fractures. In addition to these, the house-surgeon or dresser should always be provided with several sheets of strong pasteboard and some gutta-percha (gutta-percha rather less than a-quarter of an inch thick will be found the most useful). Sole leather is often also usefully employed to form splints.

Let me now describe shortly the different splints. (1), The Gooch splint illustrated at fig. 1, plate 2, is a most useful kind of appliance. It is composed of thin wood, split longitudinally, and covered on one side with thin leather. This splint can be obtained in sheets or pieces of different lengths and widths, which can be readily cut to suit any portion of the extremities, so that many fractures can be treated with it either permanently or temporarily. (2), The splint, fig. 4, plate

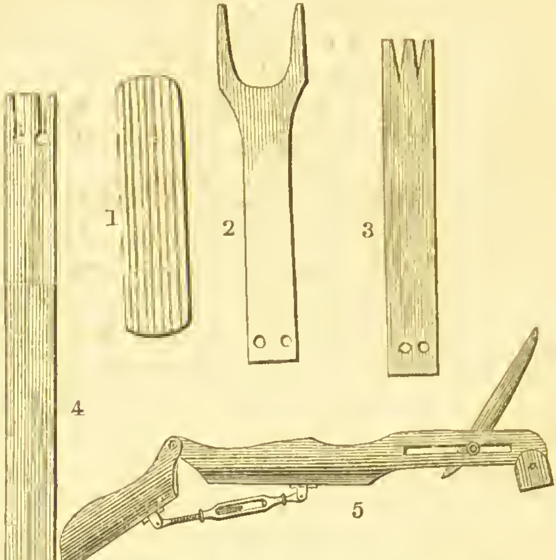

Plate 2.

2, is the long splint of Desault, and is employed to treat fractures of the thigh, and is also used when it is desired to keep the hip, knee, and other joints of the lower extremity perfectly at rest. This splint is merely a piece of wood about half-an-inch thick, and varying in width and length according to the height of the patient. The most convenient width is from four to five inches, and the splint should extend from the false ribs to about five or six inches beyond the foot. At the upper end of the splint there are two holes through which the ends of the perineal band are passed, and at the lower end there are two divisions, opening into two holes, for the purpose of connecting the foot more securely to it. An excellent modification of this splint, for treating compound fractures of the thigh, or other cases where there is a wound, consists in having a portion of the splint, corresponding to the wound, cut out, and its place supplied by a narrow arch of steel or iron. This piece of metal is to be firmly connected to each divided end of the splint, so as to make it as strong as before. In this way the wound can be examined or dressed without interfering with the splint itself. (3), Fig. 3, plate 2. This splint is usually called Dupuytren's splint, and is the one recommended by him, and generally now used for treating fractures of the lower end of the fibula, with displacement of the foot. This splint is merely a short Desault splint, and ought to extend from the condyles of the femur to about five inches beyond the foot. Fig. 2, plate 2. This splint is Mr Syme's horse-shoe splint, and is employed in cases of fracture of the leg, where the foot is displaced backwards. It is simply a piece of straight wood, terminating below in two projections, and having two holes through its upper extremity. The splint ought to extend from the tuberosity of the tibia above and below, the concavity of the horse-shoe should rest against the instep, but not press upon it.

Fig. 5, plate 2. This is the MacIntyre splint, or, rather, Liston's modification of it, and is a most useful appliance for treating many fractures of the lower extremity, especially when they are compound. This splint is made of thin metal, has a foot-piece which can be moved upwards or downwards, so as to suit limbs of different lengths, and a movable joint which is opposite the knee-joint, and which is worked by means of a screw placed underneath it. The MacIntyre splint consists, therefore, of a thigh, leg, and foot piece; and, in using it, it should be seen that each part of the splint fits the different portions of the limb. (6), Fig. 6, plate 2. This is Salter's swing-cradle or box, and is one of the most convenient appliances for suspending the lower extremity. Other varieties of the swing-cradle are used, but the principle in all is much the same. Salter's cradle consists of a frame-work or cradle, with a bar running along its top, on which two or more rollers run. One or more chains are connected to these rollers, and suspend either a sling, as shown in the illustration, or a MacIntyre or other splint. When the splint is used as shown in fig. 6, the limb, being covered by the appropriate dressings and bandage, is simply allowed to lie in the sling. A most convenient method of slinging the lower extremity in one of these frames, is one which has been proposed by Dr P. H. Watson, of this city, and which has been most successfully employed by him and some of the other surgeons of this Infirmary, in treating cases of excision of the knee-joint. This method consists in applying a long thin wooden splint (such a one as is illustrated in fig. 1, plate 2) to the back of the limb. The splint should extend from the buttocks to beyond the heel, a hollow of a horse-shoe form being cut in the lower end of the splint, in order to receive the prominence of the heel. A steel rod, of the shape shown in fig. 52, is then to be applied along the anterior aspect of the limb, the arch B being adjusted over the knee-joint, and the portion A along the dorsum of the foot. The whole apparatus is then to be secured by means of a plaster-of-Paris bandage, and when this is dry, the limb is to be slung in a Salter's cradle provided with two sets of rollers, by attaching the chains to the hooks on the steel rod. The arch of metal over the knee-joint permits of the easy dressing of the wound without any disturbance or movement of the bones.

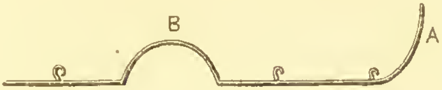

Fig. 52.

Splints of pasteboard, gutta-percha, or leather must be cut so as to fit the limb to which they are to be applied. It is useful in many cases to first cut a pattern in paper of the proper size and shape, and then from this pattern to form the pasteboard, gutta-percha, or leather splint. These splints are generally softened by soaking them in water before they are applied, and it will be found that, in the case of pasteboard and leather, the hotter the water the quicker will they be sotfened. Gutta-percha should not be placed in very hot water, as it then becomes too pliable.

Pasteboard, leather, or gutta-percha are often applied to the joints alone (especially to the knee, ankle, and elbow) in cases of chronic disease, in order to prevent motion and exercise pressure. The best method of using such splints is illustrated in fig. 53, which shows their application to a case of chronic synovitis of the knee-joint. Two splints should be made, one to fit each lateral aspect of the joint, and embrace rather less

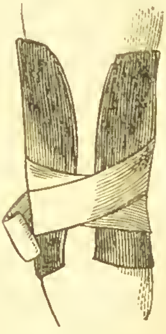

Fig. 53.

than a half of its circumference, an interval of an inch or so being left both in front and behind. In applying all these kinds of splints in a softened condition either to a limb or joint, it is usual, in the first instance, to adjust the splint itself closely to the part by means of a bandage for a few hours, until it has become stiffened and has taken the shape of the limb or joint. It may then be removed, lined by some soft material, and reapplied with circular turns, or with loops of a bandage.

A most efficient immovable splint is made by adapting a pasteboard splint to a limb, and retaining it in position by means of a starch or plaster-of-Paris bandage. This apparatus, when thoroughly dried, is one of the best means of keeping a limb or joint perfectly at rest. In applying such an apparatus to a limb, the pasteboard splints should be made in two halves, each half encircling a little less than half of the circumference of the limb, a space being left in front and behind. When it is desired to remove such a splint, a pair of strong scissors should be inserted under the bandage, opposite the anterior interval between the two splints, and the whole extent of this interval divided. The splint in this way can be removed as one entire case, and can readily be reapplied and secured in position again by a few turns of a bandage. If there should be a wound in the limb to which such a splint is adjusted, a small portion of the splint may be cut out, so as to allow the wound to be examined and dressed without interfering with the other parts.

It is also very necessary that the house-surgeon and dresser should be provided with pads, cushions, and some soft material such as cotton-wadding or tow to line splints with when they are applied. In many hospitals cushions and pillows of different sizes and shapes are kept for this purpose; but a few towels, sheets, a few handkerchiefs or slings, and some cotton-wadding are the best and cleanest appliances for padding splints. A folded towel or sheet answers quite as well as any made cushion or pad, and can always be obtained. Some flat, firm, but not too hard pillows will also be required for the purpose of placing under limbs or other parts to support them, and it is also useful to have a few blocks of wood of different sizes for the same object. In treating fractures, especially those of the lower extremity, the patient should be placed on a firm and level mattress, and, if it be possible, fracture-beds should be provided, with some cord or rope firmly suspended above, for the patient to lay hold of and move himself gently in bed. In addition, cradles of different sizes made of wood or strong wire, as shown in fig. 54, should be at hand for the purpose of keeping the bed-clothes from lying or pressing on the toes or other parts of the body.

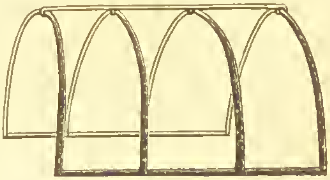
Fig. 54.

When a patient is likely to be long confined to bed, is emaciated or suffering from bed-sores, great relief will often be obtained by placing him on a water mattress. The mattress may be used of the full length, or smaller. A very useful kind is that which is long enough to allow the shoulders, back, and buttocks to rest comfortably on it. The cushion should be filled about two-thirds full of water. This, in the majority of cases, will be found most grateful, but more water may be added or taken out if agreeable. The water, when introduced, should have a temperature equal to that of the body, and it may be allowed to remain in the cushion for weeks without being changed.

Fractures are usually divided into simple and compound. They may also be complicated with a dislocation, or with a rupture of a large vessel or nerve. When a fracture is first seen, its nature and direction ought to be at once determined by gentle and careful manipulation. If the case is a medico-legal one, take a note of it, and endeavour to ascertain the cause of the injury. When there is much swelling of the limb, the diagnosis may sometimes be difficult. In such cases, the limb should be placed in an easy position, kept at rest, and warm fomentations, or acetate of lead lotion, applied, in order to reduce the swelling. If the fracture is a compound one, and the wound is small, and the bone not much comminuted, means should be taken to convert it into a simple one by healing up the wound. This is best done by dipping a piece of lint in blood or collodion, and placing it over the wound. In examining cases of fracture, care should be taken not to mistake old-standing injuries or deformities for the results of a recent accident. If there is any doubt in regard to this, the patient ought to be questioned as to whether or not any deformity existed previously. Fractures near joints are often difficult to diagnose, owing to the great mobility of the parts. The crepitus of a joint or tendon may also sometimes simulate that of a fracture. Fractures generally may be diagnosed from dislocations, by the fact that in the former there is greater mobility of the parts, while in the latter the usual mobility of the parts is diminished. When a fracture is detected, it should at once be set, and the proper splints adjusted, so as to keep the ends of the bones together. In setting fractures, the position of the limb is often of consequence. Thus in setting fractures of the leg, the bones will, in many instances, be best brought into position by flexing the knee, so as to relax the muscles of the calf, and in setting fractures of the fore-arm, the elbow may, for the same reason, often be usefully bent.

Chloroform should always be given if there is much pain or difficulty in setting a fracture, and its use will be found especially advantageous in treating these injuries in children. In treating all fractures, it is necessary to place the limb in the position which will best keep the ends of the bone or bones in apposition.

Rules are generally laid down for the treatment of the different fractures, but it may sometimes be advisable to depart from these rules if it is found that a fracture can be better kept in position by some other method. Great care must be taken not to apply bandages too tightly to a fractured limb for the first time, as considerable swelling may follow the accident, and if allowance is not made for this, serious consequences may ensue. For this reason, the bandages and appliances adjusted to fractured limbs should be daily examined for the first few days after the injury, and if they become too tight, they must be slackened or divided.

When the fracture is compound, it will be necessary to determine if the limb can be saved. If the bone is not much comminuted, and the soft textures not much lacerated, and the principal nerves, blood-vessels, and joints uninjured, it will be right to attempt to save the limb, especially if the cause which produced the accident acted indirectly. If in such instances a portion of bone protrudes, it should be sawn off, and the ends adjusted and kept in position by means of a proper appliance. Should any of the complications I have mentioned exist, or if there is any doubt about the treatment of the case, the acting-surgeon or assistant-surgeon ought to be sent for immediately. When a simple fracture is complicated with a dislocation, the dislocation may sometimes be reduced by applying splints to the fractured bone, and then using the proper extension or manipulation.

Bones are sometimes merely bent, without being broken completely through. The treatment of such injuries is to rebend the bone, and if it is broken through during this proceeding, to apply a splint or bandage in the usual way. The bones most frequently bent are the clavicle and bones of the fore-arm.

The epiphyses at the extremities of the long bones are sometimes separated by accident. The injury can only occur in young persons before this part of the bone has become connected with the shaft. These injuries must be treated like the fractures, near the particular joints in connection with which they occur.

Skull.—Fractures of the *vault* of the skull may be simple or complicated with a wound of the scalp. The fracture may consist of a mere fissure or crack, or a portion of bone may be displaced, usually downwards on to the brain. In other cases, the bone is comminuted, and one or more portions of it driven downwards. In such instances there may or may not be symptoms of concussion or compression of the brain.

Treatment.—If there are no symptoms of compression, and if the fracture be a simple one, keep the patient quiet in bed, administer a gentle purgative, and avoid all stimulating food or drink. If symptoms of inflammation of the brain or its membranes come on, shave the head, apply cold, and give a good purge or injection. When there are symptoms of compression, with a distinct depression or comminution of the bone, and when there is a wound of the scalp communicating with the fracture, send for the acting-surgeon, as an operation for raising the depressed bone will be necessary.

Fracture of the *base* of the skull is diagnosed by bleeding from the ears, and sometimes from the nose and mouth. There is in many cases also a discharge of watery fluid from the ears. The symptoms of compression are also present in most cases, and may follow the accident immediately, or some little time after. It must be seen that the bleeding from the ears, nose, or mouth, in this injury, is coming from the internal parts, and does not proceed from wounds or abrasions of the more external surfaces.

Treatment.—Keep the patient quiet, administer a purge or injection, and if he or she survives, keep down inflammatory symptoms.

Nasal Bones.—These bones, when fractured, are generally displaced downwards, and cause great deformity of the face if they are not replaced. A good deal of swelling usually follows this accident, and sometimes profuse bleeding from the nose.

Treatment.—Adjust the bones into their proper position by means of a pair of forceps, pencil, or other body, introduced into the nostrils.

Upper Jaw and Malar Bones.—These bones are occasionally fractured by direct violence. If portions of them are displaced; endeavour to replace them by manipulation.

Lower Jaw.—This bone is most frequently fractured at some point between the angle and the symphysis, occasionally through the angle, ramus, or condyles, and rarely through the symphysis. The lower jaw is sometimes broken on both sides, or in different parts, at the same time.

Treatment.—Apply either the bandage shown in fig. 16, or the four-tailed bandage, to the chin, and if this is not sufficient to keep the fragments in position, a piece of gutta-percha or pasteboard, which has been softened in hot water, should be moulded to the chin and lower jaw, and secured there by one of the bandages already referred to. When this apparatus does not succeed, and the portions of jaw are displaced, a cap of gutta-percha or metal should be fitted on to the top of the teeth on each side of the fracture, so as to keep the ends of the bone thoroughly together. If in fractures of this bone any teeth are much loosened or displaced, they should be removed. When the jaw has been secured, the patient must not be allowed to talk or to masticate solid food, but must be fed upon fluids which can generally be introduced through some irregularity or separation of the teeth. In favourable cases, the fracture takes about three weeks or a month to unite, so that at the end of this time the apparatus may be removed.

Clavicle.—This bone is most frequently broken at some part of its middle third. It may also be broken through its outer, and rarely through its inner third.

Symptoms.—Depression of the shoulder, and pain when the arm is allowed to hang down unsupported. When the fracture is in the middle third, the displacement of the fragments can generally be seen and felt, and crepitation detected by drawing back the shoulders and placing the hand over the bone. The inner fragment is usually drawn slightly upwards, and may sometimes be seen projecting against the skin, the outer fragment is drawn downwards. The fracture near the acromial process is not usually so evident, as the deformity attending it is not so great; but if the inner part of the clavicle be laid hold of with one hand, and the acromial portion seized with the other, increased mobility and crepitation will generally be detected.

Treatment.—Set the fracture by drawing the shoulders upwards, outwards, and backwards, and employ some apparatus to keep them in that position. An excellent way of setting this fracture is to place the knee against the back of the patient, and then by laying hold of the shoulders and drawing them backwards, the ends of the bone will be approximated. Many different appliances have been suggested for treating this fracture. A most simple and efficient method is the following:—Take three handkerchiefs or pieces of soft bandage, pass one under each axilla, and tie it on the top of the shoulder, taking care to interpose a pad of soft material between the skin and the knot, then attach these two bandages together in the centre of the back by means of the third one, as shown in fig. 55, so as to keep the shoulders drawn back. The elbow and fore-arm should then be well supported by means of a sling, and the apparatus is complete. If advisable, a few turns of bandage may be passed round the chest and affected arm, so as to keep the limb as fixed as possible. In all cases of fractured clavicle, it is right, if it can be done, to keep the patient on his back for the first week or so. If the fracture should be at the acromial end, without much displacement, a bandage applied over the shoulder in the figure-of-eight form, and the arm supported by a sling, will be sufficient to keep the broken fragments in apposition. This bone unites in from two to three weeks if the parts be kept at rest. A considerable amount of callus is sometimes thrown out round the broken fragments, giving rise to a hard tumour. This is in most cases gradually absorbed.

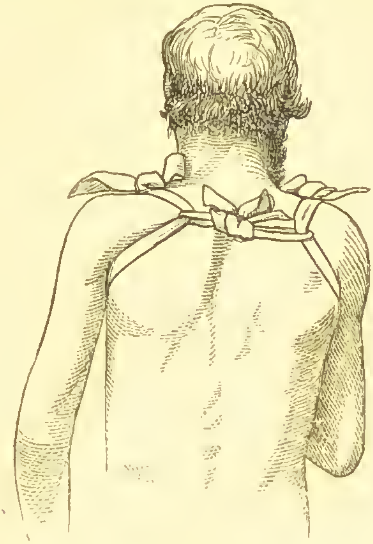

Fig. 55.

Scapula.—The body of the scapula is occasionally broken by direct violence, but the accident is not common. The treatment is to manipulate the fragments together if displaced, and apply a broad bandage round the chest and scapula.

The acromial and coracoid processes are sometimes fractured. Cases of the latter are usually associated with fracture of the neighbouring bone, or with dislocation of the head of the humerus. The treatment of the former injury is to support the arm in a sling, and keep the shoulder at rest, either by means of a clavicle apparatus or figure-of-eight bandage. The treatment of the latter, when uncomplicated, consists in slinging the arm well forward on to the chest, so as to relax the muscles connected to this process, and so allow the fragments to be brought together.

Sternum.—These injuries are rare. If caused by great and direct violence, they are apt to be associated with injury of some of the important thoracic viscera. The treatment will be to endeavour to replace the fragments in their proper position, and to apply a bandage round the chest.

Ribs.—The ribs most frequently fractured are the fourth, fifth, sixth, seventh, and eighth. The three other ribs lie deeply, and are therefore not often injured; while the false ribs, owing to their extreme mobility, rarely suffer. The ribs are most often broken through either their posterior or anterior thirds, occasionally through their middle. One rib or several may be fractured, and one or more ribs on both sides may be broken.

Symptoms.—Mobility and crepitation, which may be detected by placing the hand over the part while the patient breathes, or by applying the stethescope. There is usually also pain, with more or less catch and difficulty in the breathing. If the lung has been wounded by a fragment of rib, there may be emphysema and expectoration of blood usually mixed with air.

Treatment.—Apply a broad bandage firmly round the chest, and keep the patient quiet. If the lung is injured, endeavour to stay bleeding and keep down inflammatory symptoms. Adhesive plaister spread on leather, and applied over the injured side in the form of a broad strip, is often also a useful application. If the pain continues, cupping, either wet or dry, may be performed over the affected part.

Humerus.—This bone may be broken through its neck or tubercle, and through any portion of its shaft and condyles. In young persons the epiphyses of either extremity may become separated.

A fracture through the neck is diagnosed by the mobility of the arm not being diminished, but rather increased, the elbow can be readily brought against the side, and on rotating the limb, and placing the hand over the tubercles, crepitation can be felt. There may be a slight depression under the acromion; but this is not nearly so well-marked as in dislocation. The head of the bone can generally also be felt in its socket, and when the shaft is moved, the head does not move along with it. When the fracture is impacted, crepitation may not be present, and the head of the bone will also move along with the shaft.

The injured limb is usually more or less shortened. In order to determine whether the arm is shortened or lengthened in this or other injuries, it should be measured from the tip of the acromial process to the outer condyle.

When the fracture is through the tubercles, there may be some displacement. The symptoms of a separation of the epiphysis are much the same as a fracture through the neck, only the crepitus is not so rough, and the accident only occurs in young persons.

Treatment.—Apply a pasteboard or gutta-percha splint, so as to cover the shoulder and arm. The best method of applying this splint is to cut two pieces of pasteboard of the shape shown in figs. 56, 57, one of which should reach from the top of the shoulder to the tips of the fingers; the other from the axilla to the extremities of the fingers. These splints having been softened, the one shown in fig. 57 is to be adjusted to the shoulder, outer aspect of the arm, fore-arm, and dorsum of the hand; the other, fig. 56, to the inner

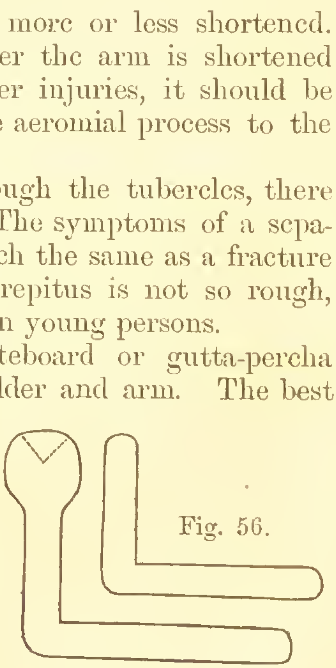

Fig. 56.

Fig. 57.

side of the arm, fore-arm, and palm of the hand, and both secured by proper bandaging. The expanded portion of the outer splint should be made long enough to embrace the whole shoulder, and, if necessary, the scapula also. It will be found that, by cutting out a triangular piece of the expanded portion of the splint, as shown by the dotted lines in the figure, it will adapt itself more evenly to the shoulder. The proper adjustment of this splint, which may be usefully employed in treating other fractures of the humerus, is illustrated in fig. 58. If there is a wound in connection with the fracture, a small piece of the splint may be cut out, as is represented on the outer aspect of the arm in the illustration, in order to obtain easy access to it without disturbing the limb. In treating fractures of the neck of the humerus, it is better not to place pads in the axilla, as they are very apt to cause displacement of the bone.

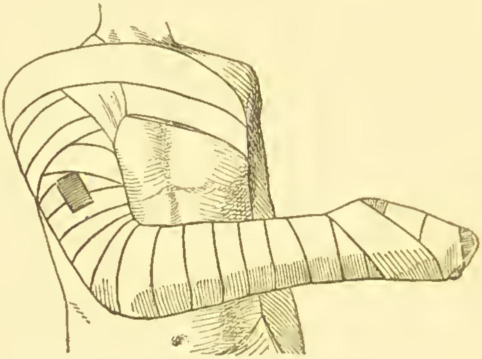

Fig. 58.

The symptoms of a fracture of the shaft are deformity and mobility of the arm, and crepitation when the broken fragments are brought together.

Treatment.—Apply simple Gooch splints to the outer and inner aspects of the arm, as shown in fig. 59, and support the arm in a sling. The outer splint should reach from a little above the shoulder to an inch or so below the elbow, and the inner one from the axilla to the same point below the elbow. Both splints should be carefully padded with soft material, and adjusted by means of a roller. If these splints are not sufficient to keep the ends of the bone together, the pasteboard splints may be employed.

The humerus is not unfrequently fractured through the base of the condyles. This accident is most commonly met with in children, and is liable to be mistaken for a dislocation of the elbow. The symptoms are deformity of the elbow, caused by displacement of the lower end of the humerus, crepitation, and, when the joint is extended, the deformity is removed, but occurs again directly the extending force is withdrawn.

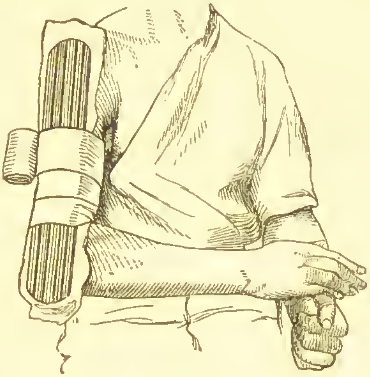
Fig. 59.

Treatment.—In most cases it is sufficient to adjust the displaced bones by manipulation and extension, and then to flex the elbow to a right angle, and apply a pad of lint over its anterior and posterior aspects, and secure them by a few figure-of-eight turns of a bandage passed round the joint. The arm and forearm should be well supported in this position by means of a sling. If this apparatus does not keep the bones in apposition, a gutta-percha or pasteboard splint should be adjusted to each lateral aspect of the joint. Such splints should extend for some little distance along the arm and fore-arm.

The condyles may also be fractured obliquely into the joint, or one or other of these processes may be fractured alone. The treatment of all these accidents consists in flexing the elbow to a right angle, applying a figure-of-eight bandage, and keeping the arm in a sling. In all fractures near the elbow or other joints, more or less anchylosis of the articulation is apt to result. It is, therefore, of great importance, in treating these injuries, to commence gentle movements of the affected joint as soon as it is likely that the fractured bones have united. If such cases have been neglected, or have been followed by stiffness of the articulation, the patient should be placed under the influence of chloroform, and the joint forcibly but carefully extended and flexed so as to separate adhesions.

Fore-arm.—Either the radius or ulna alone may be fractured, or both bones may be broken at the same time.

The radius is most frequently broken at its lower end, close to the wrist. This accident is generally readily recognised, owing to the deformity which it produces. The symptoms are slight lateral displacement of the hand, projection of the lower fragment on the back of the wrist, and crepitation, which, however, is not always distinct if the fragments should be impacted. Considerable swelling of the wrist often follows this accident.

Treatment.—Flex the elbow, return the displaced bone to its proper position, by extension and manipulation, and apply two thin wooden splints, one to the palmar surface of the fore-arm and hand, the other to the dorsal surface of the same, as shown in fig. 60. The dorsal splint should extend from the outer edge of the elbow to a little beyond the tips of the fingers, the palmar splint from the inner edge of the elbow to a corresponding point beyond the fingers. This apparatus answers well for treating all the fractures of the fore-arm, with the exception of that of the olecranon process. The splints should always be made narrower than the fore-arm, and carefully padded opposite the wrist or other hollows which may exist between the limb and their surface. When the splints have been adjusted, the fore-arm should be supported in a sling.

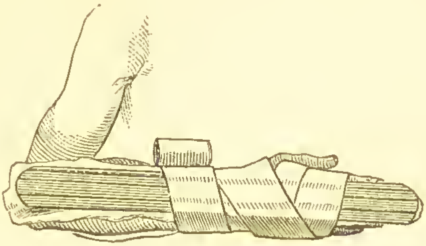

Fig. 60.

Fractures through the radius or ulna, or through both, are usually easily diagnosed by the deformity, mobility, and crepitation. The treatment of these injuries is to adjust the fractured ends by extension, and apply the side splints shown in fig. 60. Fracture of the olecranon is not an uncommon accident, and is sometimes followed by a considerable separation of the fragments. This injury is diagnosed by the displacement of the fragments, and by the mobility and crepitus which are felt on laying hold of the process. The treatment is to extend the arm, bring the two fragments together as closely as possible, then apply a straight splint over the anterior aspect of the elbow-joint, and secure it there with a bandage, as shown in fig. 61. The bandage is best applied in the figure-of-eight form, so as to draw together the fragments as much as possible.

Hand and Fingers.—The metacarpal bones may be fractured with or without displacement. These injuries are best treated by means of a simple bandage passed round the hand, or if there is displacement, by a pad placed over the displaced bone, and secured by a bandage.

The phalangeal bones of the fingers may also be fractured. These accidents are most usually compound, and frequently, therefore, require amputation. Simple fractures of the first phalanx are best treated by placing in the palm of the hand a rounded pad, such as a roller or piece of cork, flexing the injured finger upon it, and securing it in that position with a bandage. Fractures of the other phalanges are best treated by applying a straight splint made of gutta-percha, pasteboard, or wood, along their palmar surfaces, and securing them with a narrow bandage or strip of plaister.

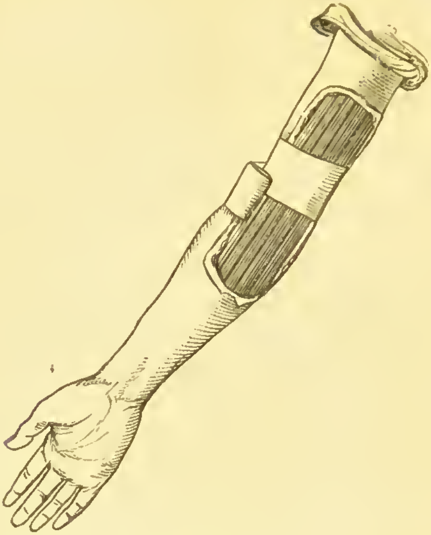

Fig. 61.

Compound fractures of the upper extremity, which do not necessitate amputation, must be treated by means of wooden or pasteboard splints, portions being cut out of these splints if necessary, to permit of access to the wound, without disturbing the arm.

Pelvis.—The expanded portion of the ilium is sometimes fractured with or without displacement. The treatment of such cases is, to apply a bandage round the abdomen and pelvis, or to adjust a broad strip of plaister across the injured region. The horizontal and descending rami of the pubes, and the ascending ramus of the ischium, may also be fractured; and, in these injuries, the urethra, bladder, or rectum may be punctured or lacerated by the broken fragments. The symptoms of fractures of the pelvis are not always distinct. Sometimes mobility and crepitus can be detected. The treatment is, to keep the patient at rest on his back, and to apply a bandage round the pelvis. If the urethra or bladder be injured, the occurrence of extravasation of urine may be expected; and, if this takes place, it must be actively treated by an incision into the centre of the perinæum, and, if necessary, into other situations.

Thigh.—The femur may be fractured through its neck, trochanters, shaft, or condyles.

Fracture through the neck may be either within the capsule of the joint ("intra capsular"), or external to it ("extra-capsular"). The symptoms of the former are, shortening of the limb from a quarter to three-quarters of an inch, eversion of the foot (inversion has been noticed in a few instances), pain when the limb is moved; and, when extension is made, the limb is readily brought to its proper length, but immediately becomes shortened again when the extending force is withdrawn. Sometimes crepitus can be detected. It not unfrequently happens that the symptoms of shortening and eversion of the foot do not appear well-marked for some hours, or even a day or two, after the injury.

In measuring the lower extremity, in order to detect lengthening or shortening, the anterior superior spine of the ilium should be taken as the point above; and the upper border of the patella, or lower border of the outer or inner maleolus, below.

Treatment.—Apply the long splint, as shown in figs. 62, 63, with the exception of the short thigh splints, which are unnecessary. These injuries generally occur in old persons; and, if such patients cannot bear the application of the long splint, the limb should be supported and arranged by means of pillows, so as to keep it at rest as much as possible. It is as well to tell these patients that, when recovery takes place, they will be more or less lame.

The extra-capsular fracture almost always involves the trochanters. In some cases the neck of the bone is driven into the trochanter major, and fixed there ("impacted fracture"). The symptoms of this injury are, shortening of the limb from one to two inches, eversion of the foot (occasionally inversion), mobility, and crepitus (unless when the fracture is impacted). The treatment is, the application of the long splint, after carefully bringing the limb to its proper length by extension and counter-extension. In comparing the length of the two limbs, see that the uninjured one has not been shortened or lengthened by previous injury or disease.

Fractures through the shaft are diagnosed by shortening and distortion of the limb, mobility, and crepitus, when the ends are brought in contact with one another.

Treatment.—Adjust the fragments into position by means of extension and counter-extension, and apply the long splint in the manner illustrated in figs. 62, 63, taken from Syme. The following appliances are required for adjusting this splint to a fractured thigh: Two thin wooden splints, one of which should extend from the trochanter major to the knee, the other from the inner side of the groin to the knee; four or five loops of bandage, and some cotton wadding; two handkerchiefs or slings; a long thigh splint, which should extend from the false ribs to five or six inches beyond the foot; and a sheet. The sheet, having been doubled so that it will extend from the inner side of the groin to the ankle, is to be wrapped round the long splint, a sufficient amount of it being left free to pass round the limb. These appliances having all been prepared, and, if advisable, the patient chloroformed, one of the handkerchiefs should be introduced round the perinæum, and

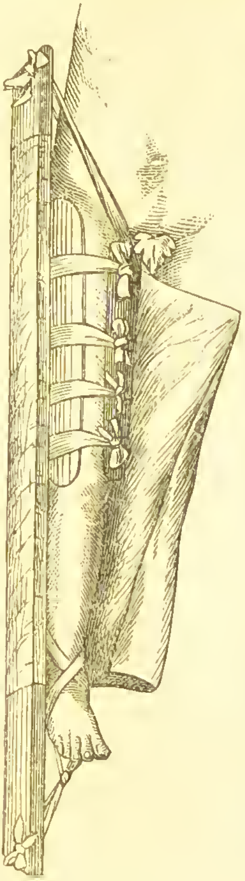

Fig. 62.

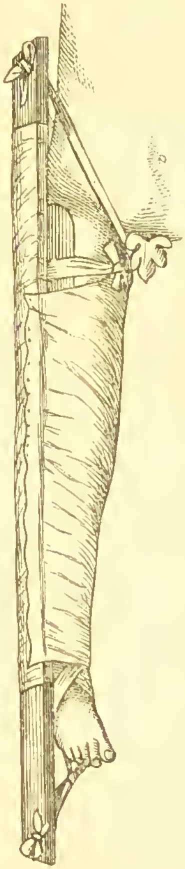

Fig. 63.

its ends brought upwards over the groin and buttocks of the injured limb, and held firmly by an assistant; another assistant must grasp the foot and extend the limb, while the surgeon manipulates the broken bone, and sees that the ends are in position. When this has been done, the two thin splints are to be applied, one to the outer, and the other to the inner side of the thigh, and firmly secured there by means of loops of bandage passed round the limb and splints, and tied on the inner splint, as shown in fig. 62. The long splint is now to be adjusted against the outer aspect of the limb, the free portion of the sheet passed under the thigh, leg, and ankle, and the ends of the handkerchief which is round the perinæum introduced through the holes at the upper end of the splint, and tied there. The second handkerchief is then to be passed, in a figure-of-eight form, round the ankle and foot, and its ends passed through the slits in the lower end of the splint, and fastened there. The free portion of the sheet is now to be brought over the front of the limb, and pinned to that portion which is wrapped round the splint, as is illustrated in fig. 63.* The long splint may be applied by means of bandages, but the sheet is quite as efficient, and is much more convenient, for it can be at any time unpinned, and the limb examined, without disturbing the bones. This splint is not only applied for fractures of the shaft, but also for fractures of the neck and disease of the hip-joint. It is applied in the same way in all cases, except that the short thigh splints are unnecessary in the two latter instances. In some cases, where the fracture is through the lower end of the shaft, or when, from previous disease or injury, the knee is anchylosed, the limb will be best treated by placing it on a MacIntyre splint, or other inclined plane.

Compound fractures of the thigh, when uncomplicated, must also be treated by the long splint, a piece of the splint being cut out opposite the wound, and replaced by an arch of metal, so as to allow the dressings to be easily applied.

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* In many cases it is useful to pass a few turns of a broad bandage round the lower part of the abdomen and pelvis and upper portion of the splint, so as to keep the latter in position

Patella.—This bone may be broken transversely, or more or less obliquely or longitudinally. The symptoms are separation of the fragments and crepitation when they are brought in contact. In cases where the fracture is oblique or longitudinal, there may be very little separation of the fragments. Occasionally the fracture is comminuted.

Treatment.—Bring the ends of the bone together by extending the limb and slightly flexing the thigh upon the abdomen, and then adjust some apparatus to keep them in position. Sir A. Cooper's method, illustrated in fig. 64, is a very excellent one; or a bandage may be applied in the figure-of-eight form round the knee, so as to draw the fragments together. Whichever apparatus or bandage be employed, the limb should be placed on a MacIntyre splint or inclined plane, with the foot and leg well raised, so as to relax the extensor muscles of the thigh.

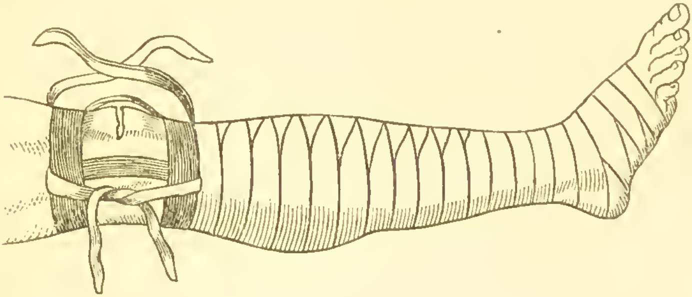

Fig. 64.

Leg.—The tibia alone may be fractured at any part of its shaft. The fracture most frequently occurs through the middle or lower third, but it may also take place somewhere through the upper third.

The fibula alone may be fractured, usually through its lower third. This accident is in most cases attended with displacement of the foot. This displacement is most frequently outwards, but may also be inwards, and occasionally backwards.

Both tibia and fibula may be broken either at the same level, or at some distance from one another. One or other, or both malleoli, may also be broken. Fractures of the leg are generally easily diagnosed by the mobility, deformity, and crepitus. In cases where the limb is much swollen, and there is little or no displacement of the fragments, it may not at first be easy to determine the existence of a fracture, but in all doubtful cases the limb should be kept at rest until the swelling has abated. In diagnosing cases of fracture near the ankle joint, attended with little displacement, it is a good plan to lay hold of one or other malleoli, and test the amount of their mobility.

Treatment.—Adjust the fragments by extension and counter-extension, flexing the knee, if necessary, to relax the muscles of the calf, and then apply some apparatus to keep the bones in position. Some fractures of the leg are best treated in the straight position; while, again, others can be more conveniently treated by placing the limb in the bent position. The limb should be placed in the position which appears best to keep the broken ends in apposition.

When the fracture is treated in the flexed position, either pasteboard or wooden splints may be used, the limb being laid on its outer side. In fig. 65, the application of the pasteboard splints is illustrated. Two pieces of pasteboard should be cut long enough to extend from the knee to the ball of the great toe, and broad enough to adjust themselves to the lateral aspects of the leg and foot. These splints.

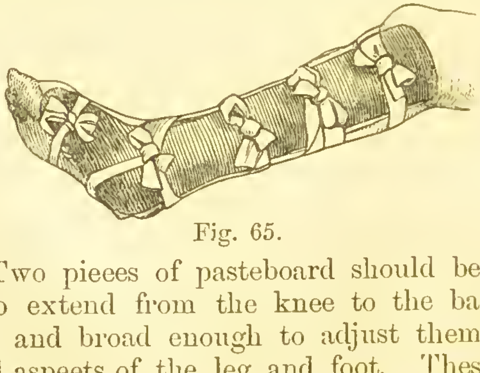

Fig. 65.

having been thoroughly softened in hot water, and lined with some cotton wadding, should be applied, one on each side to the limb, by means of an ordinary bandage. When the pasteboard has become dry, the bandage may be removed, and four or five loops substituted for it, as illustrated in the engraving. The advantage of using the loops is, that they can be tightened or slackened without interfering with the limb; and, at the same time, the upper splint can be removed, and the limb examined without at all disturbing the parts. Another method is to take two thin wooden splints, long enough to extend from the knee to a little beyond the side of the foot; and, having lined them with cotton wadding, to place one on either aspect of the leg, secure the two by a few loops, and lay the limb on its outer aspect. This latter method is useful in treating some compound fractures of the leg, where the wound is situated on the inner or anterior surface of the limb, as the upper splint can be readily lifted off, and the wound dressed or examined. A third method of treating fractures of the leg (especially when they are compound), in the flexed position, is to place the limb upon a MacIntyre splint, which has been bent to the proper angle of flexion. The application of this splint to a case of fracture of the leg is shown in fig. 66. The splint having been adjusted to the proper angle and length by means of the screw, and by regulating the footpiece (it is often best to do this by

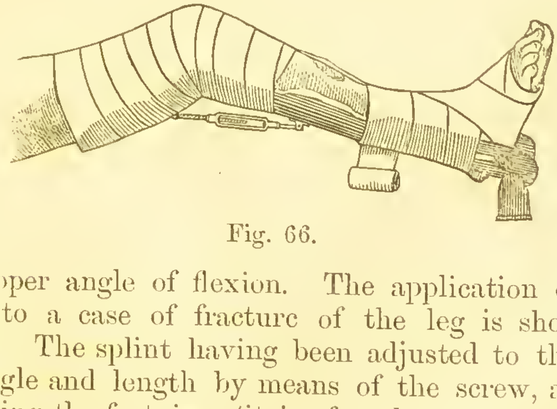

Fig. 66.

fitting the splint on the sound leg, provided it be not deformed in any way), should be carefully padded, either by means of cotton wadding or a long narrow cushion. If there is a wound, it is useful to place over the padding or cushion some thin gutta-percha sheeting, in order to prevent the discharge from soiling it. The limb must then be gently laid on the splint, and adjusted, so that every part lies in its proper place. The foot and ankle should now be secured to the footpiece and splint by means of a bandage, as shown in fig. 66, or by means of a handkerchief passed round the ankle and foot, and its ends secured round the footpiece. The thigh, knee, and upper part of the leg should also be bound to the splint with a bandage, as in the illustration. If there is no wound, the bandage should be applied so as to cover the whole limb; but if there is a wound or sore it is better to leave it free, and, if necessary, apply either a separate bandage over the wound, dressings, and splint, or employ a many-tailed bandage, which should be passed under the limb, and immediately in contact with it. In some instances, short wooden splints may be combined with the MacIntyre splint, and applied to the different aspects of the limb, in order more efficiently to retain the bones in position.

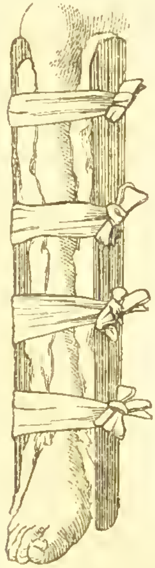
Fig. 67.

Fractures of the leg may be treated in the straight position by applying a Gooch splint to the inner and outer sides of the limb, and securing them there by means of loops, as illutrated in fig. 67. In many hospitals, side splints, made either of wood or metal, and furnished with footpieces, are employed for treating fractures of the leg; but the splints I have illustrated answer quite as well, and are generally at hand. A leg may also be kept in the straight position by means of a starch bandage and pasteboard splints. The apparatus shown in fig. 65 answers best for this purpose, the starch bandage being substituted for the loops.

Fractures of the leg which have been placed either in the flexed or extended position for a week or two, and which are progressing favourably, may often be usefully treated by applying the pasteboard splints and starch bandage, as this apparatus allows the patient to get out of bed and move about a little, without interfering with the process of union.

When the lower end of the fibula or tibia is broken, and the foot displaced inwards or outwards, Dupuytren's splint, shown in plate 2, must be applied. When the foot is turned outwards, this splint must be applied to the inner side of the leg, and when the foot is displaced inwards, to the outer side. This splint requires most frequently to be applied to the inner side of the leg; but as the method of its application to either side is the same, I have, for the sake of convenience, illustrated its application to the outer side of the limb in fig. 68. A folded sheet or narrow pillow, which will extend from the lower part of the knee to about an inch above the base of the maleolus, is to be placed between the side of the limb and the splint, and then the upper end of the splint secured to the leg by means of a bandage, and a handkerchief passed round the limb, and its ends brought through the holes of the splint, and tied. The foot must then be drawn into position, by bringing it towards the lower end of the splint, and secured there with a bandage, as illustrated in the engraving.

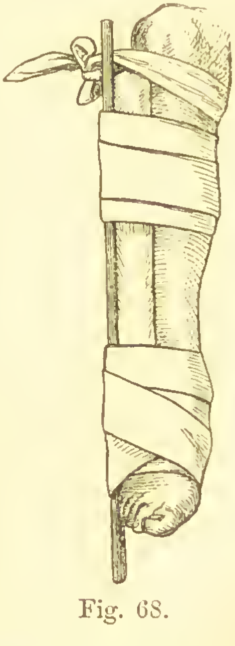
Fig. 68.

When the foot is displaced backwards, the horse-shoe splint, shown in plate 2, must be applied. The application of this splint is shown in fig. 69, and may thus be described:—Take a folded sheet or narrow pillow, which will extend from the tuberosity of the tibia to about an inch or so above the instep, and adjust it to the splint, by means of a turn or two of a bandage; then apply the splint to the anterior aspect of the leg, so that the concavity of the horse-shoe will embrace the instep, and secure it in position by means of a bandage or a handkerchief passed round the upper part of the limb. A strong handkerchief or sling should now be passed under the heel, and one of its ends brought up on each side, and fixed by a turn round the corresponding projection of the horse-shoe. By tightening these ends, the heel is drawn forwards towards the splint, and when it has been brought into its proper position, the ends should be firmly tied together in front. In adjusting this splint, care must be taken that the concavity or projection of the horse-shoe does not press upon the instep or sides of the foot. When necessary, the ends of the handkerchief can be easily tightened without disturbing the rest of the apparatus.

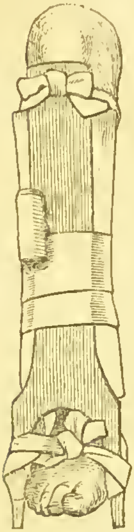
Fig. 69.

In compound fractures of the leg, when the limb admits of being saved, it should be placed on a MacIntyre splint, either in the flexed or extended position, whichever is best, or the wooden splints already described may be adjusted to the lateral aspects of the limb. These injuries are often also usefully treated by slinging them in a Salter's or other cradle, after some apparatus has been applied to keep the bones in position. In cases of compound fracture, means should always be taken to keep the apparatus and its coverings as clean as possible, and the wound ought to be carefully dressed, as often as may be necessary, without disturbing the broken bones. The many-tailed bandage, in separate pieces, may often be usefully employed to keep the dressings in position. When it is desired to change the tails of the bandage, it is only necessary to pin clean ones to one end of the soiled ones, and thus draw them carefully under the limb.

Foot and Toes.—These injuries are most frequently compound, and will usually call for excision or amputation. When the tarsal or metatarsal bones suffer a simple fracture, it is often difficult to detect it if there is no displacement. The treatment will consist in endeavouring to replace any displacement of the fragments by manipulation and extension, and then to apply a bandage round the foot.

Simple fractures of the toes require to be treated by the application of pasteboard or gutta-percha splints to their plantar aspect.

Spine.—Fractures of the vertebræ are usually associated with more or less displacement of the bones, and consequent injury to the spinal cord. Occasionally a dislocation of the vertebræ without fracture occurs, generally in the cervical region, but this is rare. A dislocation of the upper cervical vertebræ may cause immediate death, by pressing upon the upper part of the cord. Fractures and dislocations of the vertebræ are sometimes attended with distinct displacement of the spinous processes, which can be detected by external examination. In other instances there is no perceptible deformity, but merely the symptoms of compression of the cord. When these injuries have caused compression or other injury of the cord, there will be paralysis, more or less complete, of the parts of the body below the situation of the injury. If the injury is in the upper part of the spine, both upper and lower extremities will be paralysed, and, in addition, there will be interference with the respiration, and paralysis of the bladder and other organs. When the injury affects the lower part of the spine, the lower extremities and the bladder will be affected. Most of these injuries prove fatal, sooner or later.

The treatment will consist in keeping the patient on his back, drawing the urine off with a catheter if the bladder is paralysed, and relieving the bowels by injections, and supporting the patient's strength by proper nourishment. It must be remembered, too, that bed sores are very apt to form in these cases, and must be treated as is recommended in Chapter VI.

CHAPTER V.

CATHETERS. RETENTION OF URINE. EXTRAVASATION OF URINE. STRANGULATED HERNIA. VENEREAL DISEASE. PARAPHYMOSIS. PROLAPSUS ANI AND PILES.

Before proceeding to the consideration of retention of urine, I think it advisable to say a word or two in regard to some of the instruments which are used in connection with the urethra and bladder, as there is sometimes some confusion as to the nature and uses of these.

In plate 3 I have illustrated some of the instruments frequently employed in ordinary surgical practice. Fig. 1 illustrates the tube which is introduced through the perineal wound into the bladder after the operation of lithotomy. This tube varies in length, according to the age of the patient and depth of the perineum, and to one end of it there is attached a double loop of silk, as shown in the illustration, or a metal top, fig. 2, furnished with a ring on each side. These loops or rings are for the purpose of passing the tapes or bandages through in securing the instrument in position. This instrument is fastened into the bladder, by passing through each loop or ring a piece of tape or narrow bandage, and bringing its ends round the corresponding thigh, and tying them to a bandage or handkerchief which has been secured round the waist.

Figs. 4, 5, and 6 represent different forms of **Catheters**, which are employed in surgical practice to draw off urine from the bladder. Catheters are made of metal (usually silver), or some pliable material, and are numbered according to their size, No. 1 being the smallest, No. 2 a little larger, and so on up to No. 12, which is the largest in ordinary use. Catheters should be furnished with a thin wire or stillette (fig. 3), long enough to pass to the extremity of their canal. Fig. 4 illustrates the common silver catheter, of a medium size and proper curve. Fig. 6 shows a gum elastic catheter, also of medium size.

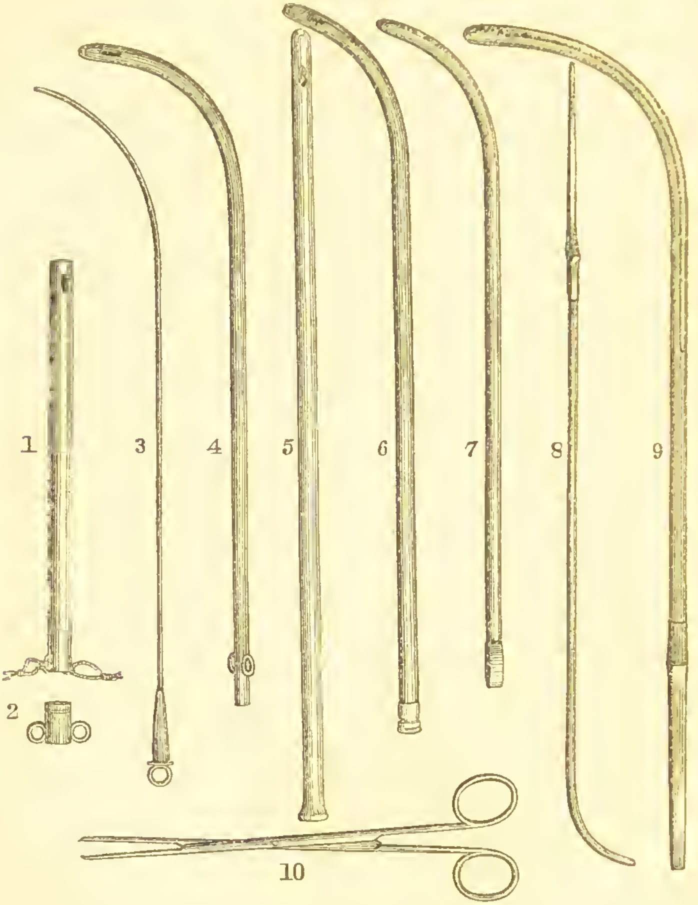

Plate 3.

Fig. 5 is a kind of pliable catheter, which has lately come into use. It is made of vulcanised India-rubber, and, although very pliable, can be easily inserted by a rotatory motion into the bladder, provided there is no obstruction in the urethra.

The female catheter is generally made in the form of a short tube, very slightly curved; but if this instrument be not at hand, a common male elastic catheter answers quite as well.

All catheters should be carefully washed out after they have been used, and their canals kept free and pervious. Some of the smaller instruments become easily blocked up, and, if passed in this state, can be of no service in removing the water from the bladder. It is a good rule, before introducing any catheter into the bladder, to blow through it, in order to see that its canal is free.

It is sometimes necessary to tie a catheter into the bladder. The best way to do this is shown at fig. 70.

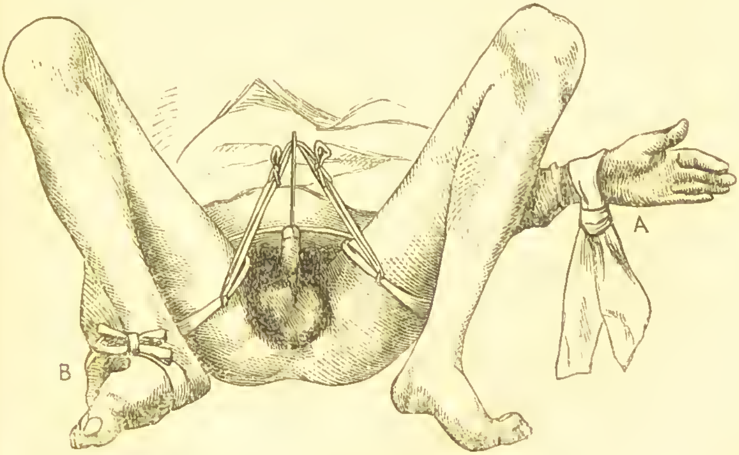

Fig. 70.

The catheter, having been introduced into the bladder, a bandage or handkerchief is to be secured round the lower part of the abdomen. A narrow bandage is also to be passed round the upper end of each thigh, and its ends brought up and tied to the waistband. A piece of tape or narrow bandage is then to be tied, at its centre, to the inner side of each of the thigh pieces, as far back as possible, and its ends passed through the corresponding ring of the catheter, and tied together. Another method, which is useful when an elastic catheter is used, is to tie round the extremity of the catheter a piece of strong silk or narrow bandage, so as to leave one end or loop of it projecting on either side. These ends or loops are then to be carried along the sides of the penis, and secured to its body by means of a strip of sticking-plaister passed round it. A useful form of silver catheter for tying into the bladder is one which is provided with a curve at its extremity; this allows the urine to flow out more readily. When catheters are tied into the bladder, it is usual to have small plugs of wood or gutta-percha, which may be introduced into the orifice, to prevent the urine flowing out continuously, these plugs being taken out when the patient wishes to pass water. It will often, also, be found very useful to attach to the extremity of the catheter a piece of vulcanised India-rubber tubing, in order that the water may be more conveniently conveyed into a receptacle placed either in the bed or outside of it. When a silver catheter is tied into the bladder, it is generally necessary to place over the pelvis a large cradle, in order to keep the bed-clothes from pressing on the end of the instrument.

In fig. 70 is also shown the method of tying up a patient before performing the operation of lithotomy, or other operation on the urethra. At A is represented the patient's hand, with the loop of bandage attached to the wrist. This is the first step of the proceeding. At B the hand is shown secured to the foot. When the loop has been adjusted to the wrist, as shown at A, the hand should be brought down to the foot, and made to grasp its outer side and instep.

The two ends of the loop are then to be passed round the sole of the foot and instep, and firmly tied. This is usually sufficient; but in some cases it may be advisable to make the ends of the loop take a turn or two round the ankle as well as the foot.

Fig. 7 shows a **Bougie**, an instrument which is employed to dilate strictures of the urethra. This instrument is best made hollow, and of some light but strong metal, with a small flattened handle at its extremity. Bougies are also numbered according to their size, in the same way as catheters, but do not require to be quite so long in the curve.

Fig. 8 illustrates a **Sound**, an instrument which is employed to search the bladder, in order to detect the existence or non-existence of a stone. This instrument is made of solid metal, has a very short curve, and an expanded metal handle. Sounds are made of different lengths and sizes, to suit urethras of various capacities.

Fig. 9 shows a **Staff**, a solid metal instrument, which is fitted with a groove on its convexity. This instrument is introduced into the bladder in the operation of lithotomy, in order that the knife may be run along its groove. Staffs are made of various sizes, and have usually a large curve. Those which are used in lateral lithotomy have the groove on the side of their convexity, those which are used in performing the median operation have the groove in the centre of their convexity. Mr Syme uses a special staff in performing his operation for stricture of the urethra. This instrument has its curved portion made much narrower than the rest, with a groove extending along its convexity, and also passing for a quarter or half-an-inch into the thicker portion.

Fig. 10 illustrates a pair of narrow forceps, which are used to extract foreign bodies from the urethra.

The following rules will guide the house-surgeon or dresser in passing a catheter or other instrument into the bladder. It is better, in most cases, to have the patient lying on his back, with his pelvis as level and straight as possible; but in some few cases instruments are more conveniently passed along the urethra when the patient is in the upright position. In these latter instances, he should be made to stand up with his back against a wall. The surgeon standing on the left side of the patient, should support the penis on the palmar surface of the fingers of his left hand, and gently raise it, so that the orifice of the urethra presents upwards. The penis should never be grasped or stretched forcibly on the catheter. The catheter or other instrument, having been well oiled and held loosely in the right hand, should then be introduced, (its handle being directed to one or other side) into the orifice of the urethra, and passed gently along the canal. When the point of the instrument has reached the membranous part of the urethra, its handle should be brought into the middle line, and kept there, then by depressing the point of the instrument and drawing the handle away from the abdomen, still keeping accurately in the middle line, the instrument will usually easily slip into the bladder, provided there be no obstruction. The point of the catheter often stops when it has reached the membranous part of the urethra, and if the depression of its point does not cause it to pass on, it should be withdrawn for a short distance, and again glided on in the same way. If this proceeding does not answer, the forefinger of the left hand, having been oiled or greased, should be introduced into the rectum, and its palmar surface brought in contact with the convexity of the catheter, then, by raising this part of the instrument, and at the same time gently pushing it forwards, it will in most cases be tilted into the bladder. It will be known that an instrument has passed into the bladder by feeling its point move freely in a cavity, and, if the instrument be a catheter, the urine will flow through it. If, in passing an instrument, any obstruction is encountered in the urethra, its point should be gently brought against it, and, if it does not yield, the instrument should be withdrawn slightly, and again gently brought against the obstructed part. If the instrument is still prevented from passing, its handle should be moved, first to one side and then to the other, and its extremity again passed along in the direction of the canal. By using the point of the instrument as a sort of probe in this way the proper channel, whether it be natural or distorted, will best be found. When the obstruction is in the posterior part of the urethra or prostate, the finger should be introduced into the rectum, and the instrument guided by means of it along the proper channel. When an instrument is to be removed from the bladder, its handle should be laid hold of, and drawn back towards the abdomen, the instrument at the same time being lifted from the urethra. If it be a catheter, the point of the finger should be pressed on the orifice, to prevent any fluid escaping from it during the removal. It is sometimes necessary to wash out the bladder or inject fluids into it. For this purpose a full-sized catheter is required, and a large syringe or India-rubber bag, fitted with a nozzle and stop-cock. Great gentleness should be used in this proceeding, taking care to steady the catheter when working the syringe, so that its extremity will not be forced against the walls of the bladder.

Retention of Urine.—The house-surgeon or dresser is frequently applied to to relieve this symptom, and it is therefore important that he should be acquainted with the causes which may produce it, and the proper treatment to be adopted for its relief. In many of the cases of retention which come to an hospital, the bladder has been allowed to become much distended, and therefore it is necessary to relieve the bladder as soon as possible by introducing a catheter into it, and drawing off the water. If there is no stricture or obstruction of the urethra this proceeding is not usually difficult, provided the surgeon follows the rules already laid down. Enlargements of the prostate sometimes render the introduction of the ordinary catheter difficult, but the method of overcoming this will be referred to immediately. Before selecting a catheter for relieving a case of retention, the patient should be questioned as to whether or not he labours under stricture of the urethra. If there is no history of any stricture, a No. 8 or 10 catheter should be first used, and if this is too large, a smaller one must be tried. If the patient labours under stricture, it will be necessary to commence with a small instrument (a No. 4), and if this is too large, a No. 2 or No. 1 must be used. Hospital patients suffering from retention, are sometimes, more or less, under the influence of intoxication when they apply for relief, and, consequently, are not able to give any intelligble account of their case.

A patient may be passing urine frequently, and in considerable quantity, and may still not be emptying his bladder properly, a certain amount of urine always remaining. This keeps the bladder more or less distended, and leads to irritation, the cause of which is not unfrequently overlooked, the surgeon thinking that as the patient is passing water freely, there can be no retention. The treatment of these cases is to pass a catheter and draw off the surplus urine, repeating the process as often as may be necessary.

Other cases are occasionally met with in which a patient has not passed any urine for some hours, or perhaps days; and if a catheter be introduced into the bladder, it is found empty or nearly so. Such cases usually depend on "suppression" of urine, and require to be treated by cupping over the loins, and the administration of purgatives.

Retention of urine may be caused—(1), By any irritation in the prostate or neck of the bladder. This irritation, by giving rise to congestion of the parts and spasmodic contraction of the surrounding muscles, may cause complete retention. The treatment of this retention from this cause, is to place the patient in a hip or warm bath, and give a sedative enema, or introduce a morphia suppository into the rectum. If these means do not relieve the patient, or if his bladder is much distended, introduce a catheter, and empty the bladder; then keep the patient in bed, repeat the bath, if necessary, and treat him with sedatives and diluent drinks, until the irritation has subsided.

(2.) Retention may be due to stricture of the urethra. In a large number of these cases the stricture is spasmodic in its nature. It frequently happens that such patients are in the habit of appearing every now and then with a fresh attack of retention, which has been brought on by drink, exposure to cold, or other exciting cause. In some of these cases the retention is complete; in others, a few drops of water may be passed, but not without much pressing and irritation. The treatment of these cases, is to place the patient in a hip bath, to give him opiates by the mouth or rectum, and to keep him at rest. If, however, the bladder is distended, or the patient suffering much pain, the catheter must be introduced. A No. 4 or No. 2 will sometimes be passed through the stricture, if its point be steadily pressed against the obstruction for a few seconds. Occasionally, the mere introduction of the instrument into or through the stricture, without entering the bladder, allows the patient to make water. Smaller instruments must be tried, if these fail, the patient being put under the influence of chloroform, if advisable. Such patients should be treated by rest in bed, and soothing means, for a few days after the attack; but it is often difficult to get hospital patients to take proper care of themselves. If there has been much difficulty in introducing a small catheter, it will generally be useful to tie it into the bladder for a day or two. When the stricture is a permanent one, the careful introduction of a small instrument will be the proper treatment. It is often advantageous, in these instances, to clear the way, as it were, for the catheter, by first introducing a small bougie, either into, or through the stricture.

(3.) Retention may be caused by enlargement of the prostate. This kind of retention is generally met with in elderly patients. The treatment is to introduce a full-sized catheter. A gum elastic or vulcanized Indian-rubber one, is often usefully employed in these cases. A difficulty in passing catheters is often met with in patients affected with enlargement of the prostate, and is best overcome by the introduction of the finger into the rectum, and by means of it guiding or assisting the point of the instrument over the obstruction into the bladder. Another method of overcoming such an obstruction, is to pass a full-sized elastic catheter, with a stillette in it, down to the prostate; and then, by withdrawing the stillette for a short distance, the extremity of the catheter is curved up, and can be readily tilted into the bladder. In some cases it is useful to employ a catheter which is an inch or two longer than the ordinary one. Patients affected with this retention, will frequently require to have their water drawn off regularly for a considerable time, or during the remainder of their lives; and it is therefore best to teach such patients to pass the catheter themselves.

(4.) Retention is occasionally produced by the lodgment of a calculus, or fragment of one, or of some other foreign body, in the urethra. If the body be situated in the posterior part of the urethra, it may be pushed back into the bladder; but if it is in the anterior portion, it should be extracted with forceps, or removed by cutting into the urethra.

If the house-surgeon or dresser fails to relieve any case of retention by the various means I have just described, it will be his duty to send for the acting-surgeon or assistant-surgeon, especially if the bladder be much distended.

Patients who have sustained injuries, or undergone surgical operations, not unfrequently suffer from an attack of retention of urine. In such cases, it is necessary to draw off the water with the catheter as often as may be required. In the majority of instances, the introduction of the catheter is only required once or twice, as the symptoms of retention soon pass off, provided there be no paralysis of the bladder.

The house-surgeon is occasionally called upon to relieve an attack of retention of urine in the female. If the bladder is distended, and the retention persistent, a short catheter must be introduced (if possible without exposing the patient), and the water drawn off.

Extravasation of Urine may take place into the tissues of the perineum, scrotum, or abdominal walls, as a result of a rupture or wound of the urethra. This accident is generally speedily followed by inflammation. suppuration, and destruction of the tissues with which the urine comes in contact. The treatment must be active and early, and consists in making free incisions into the affected parts, applying hot poultices, and supporting the patient's strength.

Hernia.—Patients affected with hernia, in some form or other, frequently apply for advice. When the hernia is reducible, the treatment is to apply a properly adjusted truss or bandage, which will keep the protruded viscus within the abdomen. A hernia, if of large size, may not admit of being returned into the abdominal cavity, and yet may lead to no obstruction of the protruded viscera. The treatment of such cases is to support the tumour by means of a sling or bandage. Again, a hernia may be temporarily prevented from being returned into the abdomen, owing to an accumulation of wind or fœcal matter in the bowel which is protruded. The treatment of this condition of a hernia is to endeavour, by means of injections or purgatives, to get the protruded bowel emptied, and to avoid any unnecessary handling of the tumour. Other hernial tumours are irreducible owing to the fact that adhesions have taken place between the sac and the external tissues. Little can be done in these cases, except to protect the hernia from being injured in any way.

The most serious condition of a hernia is that in which the protruded parts become strangulated, a condition which causes obstruction of the bowels, and which, if not soon remedied, leads in most cases to gangrene of the constricted tissues. A strangulated hernia is, therefore, looked upon as a case of emergency, and one which requires immediate attention. It occasionally happens that patients are brought to an hospital suffering from obstruction of the bowels, vomiting, and other symptoms of strangulated hernia, the cause of these symptoms not having been discovered. Whenever, therefore, a patient seeks advice for such symptoms, a careful examination of the different regions in which hernia occurs should be carefully made, in order to determine whether or not the symptoms depend upon the presence of a strangulated hernia. The diagnosis of a strangulated hernia will be determined by the presence of a hernial tumour in some of the regions where hernia is known to occur, by the existence of obstruction of the bowels, pain, usually of a twisting nature, and often referred to the umbilicus, and vomiting. There is not usually at first any great pain in the tumour itself, but if it has been much handled, or if the strangulation has existed for some time, pain may be complained of locally. In addition, there may be symptoms of peritonitis if the hernia has been strangulated for some days. The situations in which strangulated hernial tumours are most frequently found are immediately over the inguinal canal or external abdominal ring, in the scrotum or labium, immediately below Poupart's ligament, and at the umbilicus. The size of such tumours varies: they may not be larger than a small nut, or they may be as large as an orange or child's head. An inguinal hernia is diagnosed from a femoral hernia by the fact that the former is above Poupart's ligament, the latter below it.

The treatment of strangulated hernia consists in endeavouring to return the protruded parts by manipulation as soon as possible. This manipulation is termed the "Taxis." If the hernia has been some time strangulated, or has been much handled previously, great care must be used in attempting its reduction. In employing the taxis, the muscles connected with the region in which the hernia exists should be relaxed as much as possible, by placing the patient on his back, with his head and shoulders raised, and the thigh of the affected side flexed towards the abdomen. The neck of the hernia should be gently seized between the finger and thumb, and drawn slightly downwards, and then, by steadily and cautiously compressing it, endeavours should be made to press the tumour, bit by bit, up into the abdominal cavity, taking care to make the pressure so that the protruded parts will be insinuated in the direction along which they have come. When any gurgling is heard, it is generally a sign that the gut is returning into the abdomen; but this sign is not always present, as the protruded part may have consisted entirely of omentum. If, after a cautious employment of this manipulation, the hernia cannot be reduced, it will be right to attempt its reduction under chloroform. This should only, however, be done by the house-surgeon when the strangulation is recent, or when he is prepared to perform an operation if reduction is not accomplished. If it is not his duty to perform such an operation, the acting-surgeon should be sent for. When a strangulated hernia is recent, an enema is sometimes useful; but purgatives should never be given by the mouth. If there is much pain, opium in some form may be given with advantage.

Venereal Disease.—The house-surgeon and dresser will frequently be called upon to treat venereal diseases and their effects.

Gonorrhœa requires to be treated according to its stage. If the symptoms are acute, the patient should be kept as quiet as possible, his diet regulated, barley water and other demulcent drinks freely administered, the penis fomented with hot water, and some saline and diuretic medicine given. The following is an excellent saline and diuretic mixture for this affection:—

℞ Potass acet. . ʒv.
Spr. Ether. nit. ʒiij.
Aquæ, . . ℥vi.
Two table-spoonfuls thrice daily.

Chordee is best treated by bathing the penis in hot water, and by administering, at bedtime, a small teaspoonful of tincture of camphor in water.

When acute inflammatory symptoms have disappeared, injections should be carefully used. The injections should at first be weak, and then gradually increased in strength, if necessary. A solution of two or three grains of sulphate of zinc to one ounce of water, answers very well to begin with, the strength being increased to ten or twenty grains to the ounce, if need be. If there is much irritation, a little opium may be usefully added to the lotion. In some cases of gonorrhœa, cubebs, or balsam copaiba may be employed; but they need not, as a rule, be used, unless other treatment fails in relieving the disease. When inflammation of the epididymis, or testicle, takes place, it should be treated by rest, gentle aperients, and warm fomentations.

When the discharge becomes thin, and a gleet results, the tincture of the muriate of iron, or other tonics, should be given; and a bougie occasionally passed along the urethra.

Sometimes the inflammation is confined to the surface of the glans penis and prepuce (Balanitis). The treatment of this affection consists in keeping the parts clean, and injecting a little astringent lotion, so as to come in contact with the affected surface. Gonorrhœa in the female must be treated, in the first stage, by cleanliness, salines, and low diet; and afterwards, by astringent injections, used several times daily.

Chancres, or sores on the genital organs, vary in their character and in the results which they produce. Many of these sores are simple excoriations; while others depend upon true inoculation with syphilitic matter. If a sore be recent, and, especially, if it have the characters of the true Hunterian chancre, it should be at once destroyed by some strong caustic, such as nitric acid, or caustic potash. When the sore is healthy in appearance, it should be dressed with simple water dressing; and if this does not heal it, with the black wash. Should the sore have existed for some time, and be unhealthy in appearance, it is safer, in most cases, to destroy its surface with strong caustic, and then to dress it with the black wash. The sloughing, or phagædenic sore must be treated by the application of nitric acid, or a strong solution of blue stone. When buboes form, they must be treated according to their nature. If they are in a state of acute inflammation, rest and local soothing means must be used; and if suppuration takes place, an incision must be made to evacuate the matter. When the enlargement of the glands is chronic in its nature, blisters should be applied over them. The various secondary results of syphilis require to be treated constitutionally, by the administration of iodide of potassium and other suitable remedies.

Warts on the penis are not uncommon as a result of venereal disease. They are best treated by the application of blue stone. If large, they may be shaved off with a sharp knife, and then the blue stone applied to their base.

Paraphymosis may occur in the progress of venereal disease, but it is also frequently met with in children and young boys who, having drawn the prepuce back from the glans, have been unable to return it. The treatment of this condition, is to reduce the parts to their natural position as soon as possible, by laying hold of the glans, and compressing it between the fingers and thumb, at the same time drawing the prepuce over it. If the paraphymosis cannot be relieved in this way, the tightened ring round the neck of the glans, which is preventing reduction, must be divided.

Imperforate Vagina.—Female infants or children are occasionally brought to an hospital with an imperforate condition of the vaginal orifice, which usually depends upon an adhesion of the labiæ. In these cases there is generally a portion at the upper part which is not completely closed. The treatment is, to insert the point of a probe or director into the opening above, and run it down, so as to separate the adhesion. If the obstruction cannot be broken down in this way, it may be cautiously divided by the knife. Should there be any tendency for reunion to take place, a piece of oiled lint or linen may be inserted, so as to keep the edges apart.

Imperforate Anus and Rectum.—Newly-born infants are occasionally brought to the surgeon suffering from imperforate anus or rectum. In the first class of cases the anal orifice is, in most instances, closed by a membrane, which, soon after birth, becomes bulged forwards, by the accumulation of meconium behind it. The treatment of these cases is, to divide the membrane, and insert a bougie occasionally, in order to keep open the orifice.

In the second class of cases there is sometimes no anal opening; in other instances there is a distinct orifice in the situation of the anus. When no anus exists, the lower end of the rectum is usually deficient; and the treatment of such a case is, to make an incision in the usual position of the opening, and carefully cut down in the direction (backwards and upwards) of the rectum, in order to endeavour to find its extremity. If the intestine be reached, it should be opened, and, if it admits, drawn down, and attached by a few silk sutures to the edges of the external wound. When an anus exists in these cases, it is usually merely a blind canal, which does not communicate with the rectum. The rectum, in some instances, terminating above the pelvis; in others, lower down. When the rectum terminates below, its bulging can generally be felt through the blind canal of the anus. The treatment of these cases will be, to make a careful incision into any bulging tumour that can be felt. Those cases in which the rectum ends above the pelvis admit of little treatment, except the mere palliative one of opening the colon.

Prolapsus Ani and Piles.—Children suffering from prolapsus of the rectum are occasionally brought to an hospital. If the prolapsus is recent, it can usually be readily returned by gentle pressure; but if it has existed for some time, it must be well oiled, and then firmly and steadily compressed, and pushed back in the proper direction. The usual cause of this condition is some irritation in the urethra, bladder, or intestinal canal, so that means should be used to relieve any symptoms in these situations.

Prolapsus in the adult is not common; and, therefore, most of the cases of this kind which will come under the observation of the house-surgeon merely depend upon the protrusion of internal piles, which must be treated in the ordinary way. Internal piles occasionally protrude, and cannot be returned. When this takes place, the tumours are liable to become congested, inflamed, and may even slough. The proper treatment of these cases is to ligature the protruded piles, and then apply a warm poultice to the parts.

External piles also sometimes become inflamed, and, when in this state, are usually very painful. They should be treated by hip baths, warm fomentations or poultices, and by the administration of opium, if there is much pain.

If the tumours remain swollen and painful, an incision should be made into them, when it usually happens that a small firm clot escapes from their interior, and the patient gets immediate relief. If the external pile is large, and likely to prove troublesome, it will be better at the same time to cut it off.

CHAPTER VI.

OPERATING THEATRE, AND THE TREATMENT OF PATIENTS AFTER OPERATIONS. ADMINISTRATION OF CHLOROFORM.

Operating Theatre.—It is very necessary that all surgical operations should be conducted without confusion, especially in the theatre of an hospital, and, for this reason, the house-surgeon or dresser should see that all the proper arrangements have been made beforehand. It is usually the duty of the nurse who has charge of the patient to be operated upon, to furnish the theatre with towels, sponges, hot and cold water, tins, and other receptacles; and also, to have the operating-table properly provided with blankets, pillows, and a piece of waterproof sheeting. If the nurse can be depended upon, these offices may be left to her; but if not, the house-surgeon or dresser will do well to take a look into the theatre before the operation, and satisfy himself that everything necessary has been provided, and that the room has been properly heated. The house-surgeon must also see that the patient is prepared for the operation, and that he or she is divested of any clothing which may interfere with its performance. The patient's bowels should be gently opened, either the day before, or the morning of, the operation; and, if chloroform is to be used, he or she should not be permitted to take any food, except perhaps a drink of tea, coffee, or other fluid, for four or five hours previous to the operation.

The necessary instruments and appliances should also be carefully selected, and placed on a tray covered with a cloth. In "setting" the tray of instruments, the house-surgeon or dresser should go over in his mind the different steps of the operation, and lay down each instrument as it will be required. For example, if the operation be an amputation, the instruments should be laid in the following order:—1, A tourniquet; 2, a knife; 3, a saw and bone forceps; 4, artery forceps and ligatures; 5, sutures; 6, a pair of scissors; 7, lint and bandages.

A little brandy or ammonia should also be on the tray in case the patient should require to be stimulated. When everything is ready, the patient having been well protected from cold by means of proper wrappings, is to be carried down to the theatre and carefully placed on the table, covered with a blanket, and the chloroform administered if advisable. When a patient is nervous or suffering from a painful disease or injury which is likely to be aggravated by movement, it is a good plan to administer the chloroform in bed, before bringing him or her down to the theatre. Previous to going down to the theatre, each dresser or assistant ought to be told his peculiar duty during the operation, if he does not already know it, in order that there may be no unnecessary interference or confusion on the part of any one connected with the operation. One assistant will be required to administer the chloroform, another to assist the operator more immediately by compressing arteries, holding aside flaps or the edges of wounds, another to clean and squeeze sponges, another to hand the necessary instruments, and others to hold the patient if restless, or support parts which are being operated upon. All the assistants at an operation should endeavour to work together quietly, and take care not to get in the surgeon's way, or obstruct the light, or prevent the operation from being seen by the onlookers.

The duty of the gentleman administering chloroform will be considered directly. The duty of those who are immediately assisting the operator consists in steadying the parts, preventing hæmorrhage, holding the edges of wounds asunder, and doing all they can to make the performance of the operation as easy as possible for the surgeon, without interfering with his actions. The gentleman who has charge of the instruments should follow the various steps of the operation, and be ready to take from the surgeon the instrument he has finished with, and supply him with the one next required. The gentleman who looks after the sponges should be ready to hand them, clean and well squeezed, when wanted, and to take from the surgeon or his assistants the soiled ones. Those gentlemen who are holding the patient should endeavour to do so in a way which will not hide the operation from the spectators. When the operation is an amputation, it is usual for the dresser of the patient to hold the limb to be removed; he should do this by grasping it in the most convenient situation, and steadily holding it so as to prevent any locking of the surgeon's saw. When the operation is finished, the patient having had the blood sponged away as much as possible from his body and clothes, and the proper dressing applied, must be lifted gently off the table on to the chair or stretcher, a blanket placed over him, and carried back to his ward. The patient having reached his bed, which, in the meantime, should have been carefully prepared by the nurse, ought to be gently lifted into it without disturbing the dressings, and the pillows arranged so that he will lie in the most convenient position. If the patient is much exhausted, it may be necessary to give a little stimulant, and if he should be cold, to apply hot bottles to his feet or body. When there is much pain after an operation, it is in most cases advisable to administer a good sedative, thirty, forty, or sixty drops of the solution of the muriate of morphia, or some of the other preparations of opium. The house-surgeon should also look after any tumours, limbs, or other parts that have been removed at the operation, and should not allow them to be indiscriminately handled, for they are in this way often rendered useless for future satisfactory examination. Cases which have been operated upon must be carefully attended to, for the result of an operation frequently depends a good deal upon the after-treatment of the patient. If the operation has been a capital one, or one which may be followed by intermediary or secondary hæmorrhage or other accidents, the house-surgeon should always remain within call, or leave a competent substitute in his place. If intermediary hæmorrhage comes on within a few hours after the operation, it must be treated as has already been described, and if the patient is still restless or suffering pain, a second opiate may be administered. The house-surgeon should always see that the patient has been able to pass his water after an operation. If retention exists, the catheter must be used. Some patients suffer very much from sickness and vomiting after the administration of chloroform, and also from another symptom, namely, flatulence, which may lead to distension of the abdomen, and pain in the bowels. Sickness and vomiting are best treated by sucking ice, or by taking small quantities of iced water, or soda-water with a little brandy. Sometimes a little brandy alone answers best. If the vomiting should still continue, a hot poultice or a mustard poultice should be applied over the region of the stomach. Unless the patient is very weak, it is advisable in most cases not to give him or her any stimulating drinks or food for the first few days after the operation. Milk, beef tea, tea, cocoa or coffee, arrow-root, sago, gruel, or other such like articles, may be given in the first instance, and then these may be followed by a little fish, tripe, chicken, or other easily digested substances. If the patient continues to be restless at nights, an opiate should be given at bedtime. At the end of the second or third day after the operation, the patient's bowels should be opened by some gentle purgative or laxative, or by an enema, provided there are no counter-indications to this from the nature of the case. If the patient has been troubled with much griping or uneasiness in his bowels, it is a useful thing to conjoin with the purgative some sedative. A dessert or tablespoonful of castor oil, with ten or fifteen drops of solution of muriate of morphia, is one of the best purgative medicines after cases of operation. If at the end of a week all is going on well, the patient's diet may be improved, and stimulants given if advisable.

The wound or wounds made at the operation must be treated according to the general principles already referred to in a previous part of this book. If the wound heals by the first intention, it will only be necessary to keep the part at rest, for the adhesion between the edges of such a wound may be readily separated by any injudicious movement. When the wound suppurates, it will be necessary to dress it carefully and regularly, taking care to keep the surrounding parts clean, and to disturb them as little as possible. If, in the progress of the case, the patient should suffer from weakness, stimulants and tonics must be administered.

Bed-Sores.—When patients are much weakened or emaciated, and have been obliged to lie in one position for a considerable time, bed-sores are very apt to form over those prominent parts of the body which have been lain upon. Persons labouring under paralysis, from injury or other causes, are particularly liable to suffer in this way. The common situations for such sores are over the prominent points of the vertebræ, sacrum, and coccyx, trochanter major, shoulders, and heels, occasionally also over the elbow. These sores usually commence by more or less redness of the skin, which is speedily followed by ulceration or sloughing, if the pressure be not taken off the affected part. Occasionally, a portion of skin dies without much redness, and when it separates, leaves an ulcerated surface. It is of great consequence, in these cases, to prevent, if possible, the skin being broken, and this may sometimes be done by rubbing the part with a little brandy or other spirit two or three times a-day. A piece of sticking-plaister, or a pad of cotton-wadding or lint covered with sticking-plaister also answers well in some cases. When a sore has formed, the only satisfactory treatment is to keep pressure off it as well as possible, and to dress it with simple water or greasy dressing. If sloughs form, poultices must be applied until they separate. If bed-sores are extensive, the patient should be placed on a water mattress, the proper way to use which has already been described at page 143.

Administration of Chloroform.—In some hospitals it is the special duty of a gentleman to administer chloroform; but in the Edinburgh Infirmary the house-surgeon, clerk, or senior dresser, performs this duty. Inhalers, and other apparatus, are also employed in some hospitals to give chloroform; but it has always been the practice in this Infirmary to use a simple folded towel for the purpose, and with the most satisfactory results. No heavy meal should be taken for at least four or five hours before chloroform is administered. In administering chloroform in connection with surgery, it ought always to be given until it has produced its full anæsthetic effect upon the patient.

In whatever way chloroform is administered, the person administering it should devote his sole attention (even in the most trifling operations) to the proceeding. watching carefully its effects upon the patient, and especially seeing that the patient's respiration is being carried on properly. The administrator of chloroform should always have at hand a pair of artery catch forceps, in order to draw forward the tongue, if necessary. By some surgeons, the changes of the pulse are carefully watched during the administration of chloroform; but unless the patient is losing much blood, or is very weak, the state of the pulse is of little consequence. Patients often ask if they are safe subjects to take chloroform, and it therefore comes to be a question whether or not there are any symptoms which contra-indicate the use of chloroform. Experience has not shown that there are any distinct symptoms in a patient which will lead us to the conclusion that the use of chloroform is dangerous in his or her case, and therefore, unless the patient strongly objects, chloroform may be given in all cases where its employment is thought advisable by the surgeon.

The patient should be placed on his back, with his head and shoulders raised on a pillow; or if more convenient for the performance of the operation, in the sitting posture, with his head not thrown too far back, and anything which may be round his neck slackened. A towel or handkerchief folded square should then be taken, and its centre made into a shallow cup or hollow. A little chloroform must be poured into this hollow, and the towel brought within a few inches of the patient's face. If the patient complains of its being too strong, it may be withdrawn a little further from the face. The towel should, after a few seconds, be brought gradually nearer the face, and if it is not complained of, its hollow placed immediately in contact with the mouth and nostrils, so that they lie in it. Some chloroform should be added from time to time, by pouring it into the hollow of the towel, which should be removed for the purpose. During all this time the patient's breathing must be carefully watched, and if there is any difficulty noticed in it, the tongue should be laid hold of with the forceps and drawn well out of the mouth. When the chloroform has been given for a minute or two (the time varies in different persons), the patient becomes restless, and more or less excited, sometimes struggling violently, and singing or shouting. Very soon after this, in most cases, complete insensibility results, and the operation may be performed. The amount of restlessness and excitement differs in different patients. In some a few inhalations of the chloroform makes them restless and excited, while in others it may take a few minutes before this stage is reached. Occasionally patients remain for a considerable time in this excited stage, and sometimes never become perfectly insensible. In order to determine if the patient is insensible to pain, and fully anæsthetised, the eyeball should be touched with the finger, and if no winking follows, it is a sign that the patient is unconscious. This test will be found satisfactory in the majority of cases. Infants, children, and some adults come very speedily under the influence of chloroform, a few seconds is often sufficient to make such patients completely insensible. In these patients the effect of the chloroform is generally short, and therefore the inhalation must be kept up. When a patient has been put under the influence of chloroform, it is usually necessary to continue its effects for some time. In order to do this, the patient's state of insensibility should be noted, and more chloroform administered from time to time if required. Some patients are troubled with sickness and vomiting during the administration of chloroform; but if the stomach is empty (as it ought to be), this will in most cases soon cease. If patients do vomit, they should be turned over on their side, and their head supported, in order that the stomach may more easily empty itself. Children, and sometimes adults, frequently fall into a sound sleep after they have had chloroform, which may last for several hours, and if their breathing is natural, and everything going on well, it is better to keep them quiet and allow them to sleep.

This is the method of giving chloroform usually followed here; but there is another mode which is extremely useful when the effects are required to be kept up for a long time, or when the surgeon has not much chloroform at hand. The latter method consists in dropping a small quantity of chloroform on to a single fold of a handkerchief or piece of linen, holding it over the mouth and nostrils of the patient, and from time to time dropping a little more chloroform upon it, without raising it from the face. In this way a very small quantity of chloroform will in time render a patient insensible ; but the effect is not so quickly produced as in the ordinary way.

If, during the administration of chloroform, the patient's breathing becomes obstructed, or stops altogether, and drawing forward the tongue does not relieve it, cold water should be dashed upon the patient's face and chest, and artificial respiration employed.

CHAPTER VII.

MINOR OPERATIONS.

THE house-surgeon or dresser is frequently called upon to perform the minor operations of surgery, either at the desire of the acting-surgeon or on his own responsibility, and as he may have to perform them in the presence of students, it is very necessary that he should be well acquainted with the easiest and best methods of doing them.

Incisions may require to be made for the relief of local inflammations or suppurations, or for the purpose of extracting foreign bodies, securing arteries, &c. Incisions should be made as much as possible in the longitudinal direction of the parts, unless there be some good reason for deviating from this rule. When any part of the face, neck and arms, shoulders or breasts in the female, require to be incised, the wound should be made in the direction which will best hide the scar. In the face or neck the direction of the lines or wrinkles may often be followed for this purpose. In whatever direction incisions are made, the position of important arteries, veins, or cavities, should, if possible, be avoided. If it is necessary to make a wound in such situations, great care must be exercised in order to avoid injuring any of these structures. A carbuncle should be incised in the form of a cross or star (if necessary), each wound passing completely through the substance of the tumour, and well through all its thickened and inflamed margins. When the incision requires to be made of some extent and depth, the best instrument for the purpose is the straight bistoury. This instrument should be held in the manner illustrated in fig. 71, which is taken from Liston.

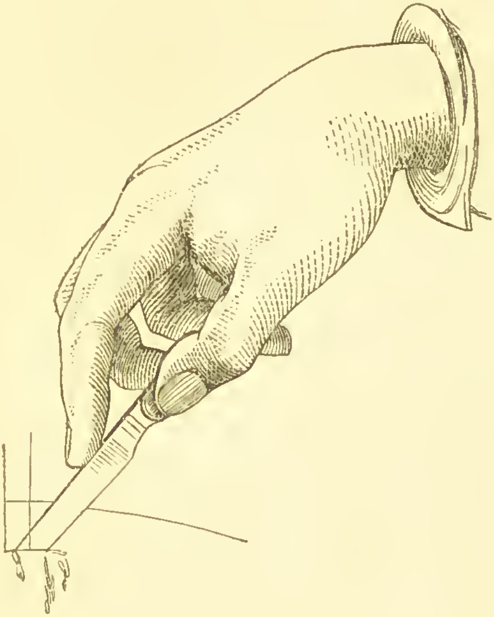

Fig. 71.

If there are important structures in the neighbourhood of the incision, the knife may be held and used as the common dissecting scalpel, each tissue being cautiously divided until the proper depth has been reached. When the incision is only required to be superficial and limited, as in opening abscesses near the surface, the best instrument to use is Syme's abscess knife, or an ordinary curved sharp-pointed bistoury. In using either of these knives, the back of the blade should be directed towards the skin, and the sharp edge directed upwards. The point of the knife is then to be plunged through the skin, and brought out again at some little distance. When this has been done, it is only necessary to raise the whole blade of the instrument, so as to divide the tissues between its opening of entrance and exit. If a previously existing wound or sinus requires to be enlarged, a probe-pointed curved bistoury is the best for the purpose, the blunted point being introduced into the wound, and its edges divided in the requisite direction and to the proper extent. When incisions are required in cases of diffuse suppuration, or in phlegmonous erysipelas, they must be made freely and quite down to the areolar tissue or seat of the suppuration. In some cases, after making incisions, it may be advisable to encourage the bleeding by bathing the parts with warm water. Should the bleeding be excessive, a compress of dry lint may be secured over the wound for a few hours by means of a bandage.

Abscess.—When abscesses are acute, they require to be opened by incision. In doing this, the wound must be made at that point which will best allow the matter to drain out, and sufficiently large for the same reason. If the abscess is away from important structures, and is situated at some depth from the surface, the point of the bistoury should be plunged into it, as shown at fig. 71, and the necessary incision made; but if there are important structures near, a careful dissection should be made through the tissues until the pus is reached. When the matter has been evacuated from an abscess by incision, a small piece of lint, or a portion of drainage tube, presently to be described, should be inserted into the wound, and allowed to remain there for ten or twelve hours, in order to prevent the edges of the wound healing by the first intention. A little gentle but steady pressure exercised over the situation of the cavity of an abscess which has been opened will often be useful in assisting it to contract and heal, care being taken to leave the wound open and free, so that any discharge may escape. Should bleeding follow the opening of an abscess and prove excessive, its cavity should be stuffed with strips of lint, the strips being counted, in order that when they require to be removed, none may be left behind.

Abscesses frequently occur in the breasts of women during lactation, in the majority of cases in the first month after child-birth. These abscesses must be treated by warm fomentations in the first instance, and by free incision when suppuration has taken place. An abscess occasionally forms in one tonsil, and as it increases in size, it may push forward the soft palate or interfere with respiration and deglutition. These abscesses often give rise to much pain and distress, and should, therefore, be opened as early as possible, by introducing a sharp-pointed knife, the blade of which has been protected by a piece of lint or bandage wrapped round it, to within an inch or half-an-inch of its point, into the mouth, and thrusting it into the tumour. The knife ought to be directed towards the middle line as much as possible. Abscesses also sometimes form in connection with the pharynx, and may either point in the neck, or at the back of the throat. When they appear in the former situation, a careful incision must be made through the tissues of the neck, until the matter is reached.

Suppuration frequently takes place in the superficial or deep textures of the fingers or thumb, giving rise to whitlow. Such cases must always be treated by early incision, for if the pus is not evacuated, the tendons or bones are liable to be destroyed. The best way to open whitlows, which are almost always on the palmar surface of the digits, is to lay the finger on a table, with its palmar surface directed upwards, and then, with a sharp-pointed knife, to make a free incision of sufficient depth along the centre of this surface.

Suppuration and ulceration also take place at the matrix, and around the margins of the nails ("Onychia"). This disease is often tedious in its progress, and is to be treated by removing the nail, if it has become loosened; and then, if the sore does not heal, applying caustic to the ulcerated surface. If the affection is the result of syphilis, proper constitutional treatment will also be necessary.

Abscesses sometimes form in the neighbourhood of the rectum, usually at one or other side, in the ischio-rectal fossa. Such abscesses, if neglected, usually end in fistula in ano. They should be opened early by an incision made parallel to the rectum, but without injuring it.

Abscesses forming in connection with the prostate and urethra, generally point in the perineum. It is of consequence that these abscesses should be detected as early as possible; for the matter, if not evacuated, is apt to spread and lead to troublesome fistulous openings. Whenever suppuration is detected in the region of the perineum (in examining such cases one finger ought to be introduced into the rectum, and another placed on the perineum), a free longitudinal incision should be made in the centre of the perineum. The incision should be deep enough to reach the pus. In some cases it may be necessary to cut to the depth of one or two inches.

Chronic Abscesses of large size should not, as a rule, be opened by direct incision. Such collections of matter are best drawn off by means of a trochar and canula, or treated by the introduction of M. Chassaignac's drainage tube. This latter method of treating chronic abscesses may also be usefully employed in certain cases of sinus, fistula, or cystic tumours. This method consists in passing through the abscess, sinus or cyst a piece of vulcanised India-rubber tube which is perforated with small holes, and adjusting it so as to allow the matter or fluid to drain off through it. This tube may also sometimes be usefully passed through a joint which is suppurating, in order to drain away the pus.

Drainage Tube.—The best way to introduce this tube is to take a long curved trochar and canula (the ordinary trochar and canula used for tapping the bladder through the rectum answers very well when the cyst is not very large), and transfix the cavity of the abscess, cyst, or joint; then, having removed the trochar, pass a piece of the tube of sufficient length through the canula, as shown in fig. 72. One end of the tube being now laid hold of, the canula should be withdrawn, so as to leave the former behind. The two ends of the tube are then to be fastened together, as shown in fig. 73, care being taken not to tie the thread which secures them too tightly round the canal, so as to obliterate it. Another method of securing the tube is to fasten a button to one end, so as to prevent its slipping through the wound, and allow the other end to hang out at the lower part of the abscess or cyst. In either instance, the tube should be regularly moved in the wound, and if its canal has become in any way obstructed, a little water may be injected into one end. Astringent or other lotions may also be injected through the tube into the cavity of the abscess or cyst, if advisable. The tube may be allowed to remain in until the discharge has ceased, or nearly so, and the cavity of the abscess has contracted, when it should be removed.

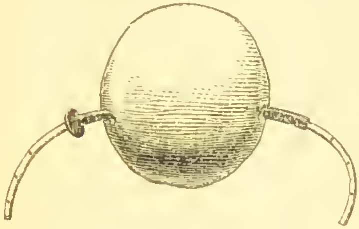

Fig. 72.

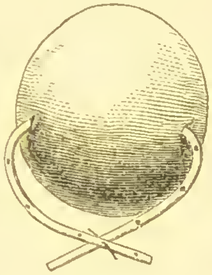

Fig. 73.

Leeching.—The number of leeches applied to a part depends on the amount of blood which it is desired to extract. Leeches should always be obtained as fresh as possible, and before applying them the skin should be well cleaned. When several leeches are applied to the external surface, they may be placed on the skin, and a tumbler or glass put over them until they adhere, or they may be laid hold of with the fingers, and their mouths directed against the part. When a single leech is applied to some part of the mouth, or to some limited point of surface, it should be placed in a glass tube, and the end of the tube corresponding to the animal's mouth brought in contact with it. When leeches have filled themselves with blood, they usually drop off, but sometimes they continue to adhere for a considerable time; a little salt applied to them speedily causes them to become detached. If it be advisable, the bleeding from the leech bites may be encouraged by fomenting the part with warm water, after the leeches have been withdrawn. Sometimes leech bites continue to bleed freely. If the pressure of a pad of lint does not stop the bleeding, the point of a fine stick of nitrate of silver ought to be inserted into the wound, and if this fails to stay the hæmorrhage, the bite should be transfixed by a small pin or needle, and a piece of silk or thread tied round underneath it so as to include the whole wound.

Cupping.—This operation is performed either with or without the extraction of blood from the body. The latter is termed "dry" cupping. Cupping glasses of different sizes, a scarificator, a spirit lamp, some hot water, lucifer matches or a lighted candle, and a little common sticking plaister, are the appliances necessary for the operation. When the situation for the operation has been selected, it should first be sponged with hot water, and a suitable glass having been warmed, is to be held for a second or two over the flame of the spirit lamp, until the air in it has been rarefied,

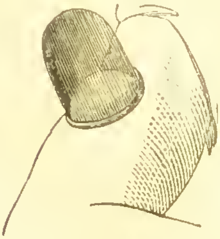
Fig. 74.

and then rapidly placed in contact with the skin, and kept firmly and steadily against it. If the operation has been successful, the glass adheres, the soft textures rising up into the glass, as shown in fig. 74. Should a spirit lamp not be at hand, a piece of paper may be lighted and introduced into the glass before it is applied to the surface. In either instance, care must be taken not to heat the margins of the glass, for if so heated, they may burn the skin when brought against it.

If dry cupping only is desired, this completes the operation, one or more glasses being used according as may be thought necessary.

When, however, blood is to be drawn from the body, the scarificator requires to be used. This instrument is furnished with a number of movable lancets, which are rapidly protruded when a spring at its side is touched. The lancets admit of being set to different lengths, and should be regulated before the operation according to the thickness of the skin of the part. The first steps of the operation are the same as dry cupping, but after a glass has been applied to the skin, and has taken a good hold, it must be removed, the scarificator placed firmly on the part which was included under the glass, the spring touched, the instrument removed, and then the glass reapplied as before. By this means the blood is drawn out, and flows into the glass, which should be taken off when the bleeding ceases or nearly so, the wound sponged with warm water, and the same glass (having been emptied) or a clean one reapplied. When a sufficient amount of blood has been abstracted, the parts ought to be cleaned, dried, and a square or circular piece of sticking plaister adjusted so as to cover all the lancet wounds. This plaister may be changed if necessary after two or three days, but the wounds usually heal very quickly.

Venesection.—This operation is most frequently performed on the veins at the bend of the elbow. It is not of much consequence which vein is opened in this situation, provided it is superficial and sufficiently large. Either the median basilic or median-cephalic vein is generally chosen, the latter being the best, as it is away from the position of the brachial artery. If possible, the patient should be in the sitting posture, with the arm to be operated on hanging down, and the fore-arm and hand supinated. A piece of bandage or tape is first to be fastened round the lower third of the arm, tight enough to stay the venous circulation, without interfering with the arterial flow, and the veins of the arm made as prominent as possible, by causing the patient to grasp in his hand some rounded body, such as is shown in fig. 75. The surgeon having selected a vein, should place the thumb of his left hand upon it, so as steadily to fix it, and then having laid hold of the lancet or knife between the finger and thumb of the right hand, should open into the vein, by means of a small oblique incision. If the vein has been properly opened, the blood will flow out in a continuous stream as soon as the thumb is taken off the vein, and, therefore, a tin or other receptacle should be held so as to catch it. Should the blood not flow freely, the patient

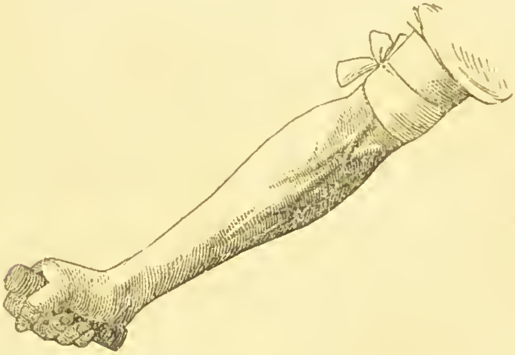

Fig. 75.

must be desired to grasp the body in his hand more firmly, and at the same time the patient's fore-arm may be rubbed in a direction upwards. When a sufficient amount of blood has been taken, a pad of lint must be placed accurately over the wound, and kept in position by the figure-of-eight bandage passed round the elbow.

The external jugular vein is sometimes opened in order to extract blood from the head or neck. The situation usually chosen for this operation is at the point where the vein crosses the sterno-mastoid muscle. In performing the operation, the vein must be fixed below with the thumb, and an incision made into it in the direction of the fibres of the sterno-mastoid muscle. When sufficient blood has been extracted, a pad must be placed over the wound, and retained by means of a bandage or sticking-plaister.

Tracheotomy.—The house-surgeon or dresser will sometimes have to perform this operation in cases of emergency. In adults whose necks are not short or fat, or altered by disease, the operation is usually very simple; but in children and some adults tracheotomy is more difficult. I cannot here give an account of the various affections which may require this operation, but will merely describe the operation itself. It sometimes happens that a patient is admitted into an hospital suffering from an hysterical or a spasmodic affection of the throat, which may simulate a more serious disease, and produce symptoms resembling those of suffocation. The house-surgeon or dresser should be careful not to perform tracheotomy in such cases.

The instruments required for the operation of tracheotomy are, a knife (either a bistoury or a scalpel), a pair of dissecting forceps, two or three blunt hooks, a sharp hook, artery forceps and ligatures, and a tracheotomy tube of the requisite size, with a piece of narrow bandage or tape, by means of which it may be tied into the wound. One or two feathers should also be provided, for the purpose of cleaning out the tube when it becomes obstructed. In performing the operation, the patient's head should be held well back, and steadily supported by an assistant. The operator, standing upon the right side of the patient, should then make an incision in the middle line of the neck from the cricoid cartilage to the sternum, so as to divide the skin and cellular tissue. Some veins are generally then met with, and these must be held aside, or, if they are in the way, tied and divided. When the inner edges of the sterno-thyroid and sterno-hyoid muscles are reached, they should be turned on each side, and the trachea carefully laid bare by separating from it any other tissue which may lie over it. At the upper part of the wound lies the isthmus of the thyroid gland, which should not be injured if it can be avoided. When the trachea has been exposed for the space of half-an-inch or so, and all arterial bleeding stayed, a sharp hook should be inserted into the upper part of the exposed portion, so as to steady it, and then the point of the knife, with the back of the blade directed downwards. should be plunged into it, and two or three rings divided from below upwards, so as to make a wound sufficiently large to admit the tube. After the trachea has been opened, there is generally a rush of air and mucus through the wound; and, in cases of croup or diphtheria, pieces of false membrane may also be discharged. The tube is then to be introduced into the wound in the trachea, and this is not always an easy matter, owing to the rounded shape of the trachea and the want of gaping in the wound. If the tube cannot be introduced, the handle of the knife or the points of the dissecting forceps should be passed into the wound, so as to separate its edges and permit of its passage.

When the tube has been passed into the trachea, it must be tied in by means of a tape introduced through the slit at each side, as shown in fig. 76, the ends being carried round the neck, and secured. The surgeon should make sure that the tube is in the trachea, for it occasionally happens that it passes down alongside, but external to the trachea. The size and length of the tube inserted should depend upon the age of the patient and depth of the neck. A single or double tube may be employed. In children or in adults, where there is much discharge of mucus or false membrane, it is best to use a double tube, so that the inner one can be removed and cleaned without disturbing the one in the wound. If an obstruction to the breathing should be found to exist below the situation of the opening in the trachea, a piece of tube or an elastic catheter may be passed down through the wound in the trachea, so as to get beyond the obstructing cause. After the operation, the patient requires to be carefully watched, the temperature of the air regulated, and the tube cleaned out by a feather, probe, or forceps, whenever its canal becomes blocked up. It is advisable to place over the mouth of the tube a piece of fine muslin or other cloth, and if there is much irritation in the air passages, such cloth may be steeped in hot water and applied in the same way, in order that the heated vapour may be inhaled. Chloroform may also be administered to relieve spasm, by holding a piece of cloth on which some of this fluid has been dropped over the opening of the tube. If the operation has been performed on a patient who is insensible, or

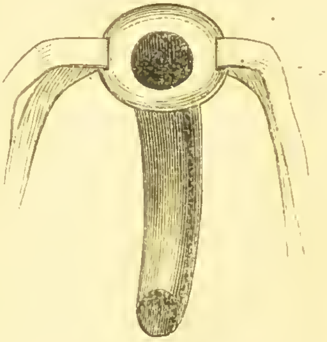
Fig. 76.

nearly so, artificial respiration should be employed as soon as the tube has been introduced, and kept up as long as advisable. When tracheotomy has been performed successfully for the extraction of a foreign body from the air passages, it is not necessary to introduce a tube into the wound; for it is desirable that it should heal as soon as possible. During the progress of a case of tracheotomy, the tube may require to be changed. This must always be done with care, and the handle of a knife or the points of a pair of dissecting forceps introduced into the wound, so as to keep it open and permit of the tube being re-introduced. When the natural passage through the larynx remains long obstructed, a tube may be used which has an opening in the posterior wall of its convexity, in order that some air may pass upwards.

Laryngotomy.—This operation is only to be employed in cases of sudden choking, the result of the lodgment of a foreign body, or of some rapid swelling in the upper part of the larynx. The operation is performed by thrusting the point of a knife through the crico-thyroid membrane, and then, if necessary, a quill or small tracheotomy tube may be introduced into the wound. In performing laryngotomy, care must be taken not to introduce the knife between the hyoid bone and thyroid cartilage, instead of between the thyroid and cricoid cartilages.

Division of Frœnum Linguæ.—Children supposed to be tongue-tied are often brought by their mothers to have an operation performed for its relief. In the majority of cases no contraction of the frœnum exists. but in a few instances this band will be found too tight, and require division. In such cases it should be cautiously nicked with a pair of scissors; a very slight division is usually sufficient.

Paracentesis Abdominis.—The best situation for performing this operation is in the linea alba, at a point midway between the umbilicus and pubes. The instruments necessary for this operation are a large trochar and canula, and there should also be one or two tins or pails at hand to receive the fluid. The patient should be placed in the sitting posture, or on his or her side, and a sheet or broad bandage passed round the abdomen, and its ends held behind by an assistant, who should gradually tighten it as the fluid flows out. When everything is ready, the surgeon should plunge the trochar and canula through the abdominal walls, and when he feels that the cavity has been entered, the trochar must be withdrawn. After all the fluid has been drawn off, the canula must also be taken out, and a piece of sticking-plaister or a pad of lint adjusted over the opening made by the instrument. A broad bandage should then be passed round the abdomen, and the patient laid in the horizontal position.

Paracentesis Thoracis.—This operation may be required to evacuate air, serum, or pus from the pleural cavity. The proper situation for tapping the chest is through one of the intercostal spaces between the fifth and eighth ribs (between the sixth and seventh is the usual place), at a point corresponding to their angles. The instrument employed to perform this operation is a trochar and canula, which should be much smaller than that employed for tapping the abdomen. In tapping the chest it is better to draw the skin a little to one side before thrusting the instrument through it, in order that the external wound, after the operation, may not communicate directly with the pleural cavity. The instrument should be introduced through the centre of the intercostal space into the cavity of the pleura, and when it has reached the cavity the trochar ought to be withdrawn, and the air or fluid drawn off. When the canula is taken out, a piece of sticking plaister should be placed over the wound, and, if advisable, a bandage adjusted round the chest.

Excision of the Tonsils and Uvula.—When one or both tonsils are much enlarged, portions of them may require to be removed. In older children and adults, the operation is usually very easy, but in young children its performance is not unfrequently a matter of some difficulty. If the child is very restless, chloroform may be given. In performing this operation the prominent portion of the tonsil should be seized with a pair of sharp-hooked forceps, or a sharp hook, and the requisite amount sliced off with a probe-pointed bistoury. The knife should be very sharp, for if it only cuts partially through the tonsil, it is not always easy to get a second cut made, so as to detach it thoroughly.

When the uvula is elongated, its extremity sometimes requires to be cut off. This is best done by seizing it with a pair of forceps, and then separating it with a knife or pair of scissors. If troublesome bleeding should follow the operation, a ligature passed round the base of the uvula will at once stay it.

Circumcision.—This operation is best performed by laying hold of the end of the prepuce with the finger and thumb, or with a pair of artery catch forceps, and then cutting off the redundant portion with a pair of sharp scissors, taking care not to injure the glans. When the extremity of the prepuce is cut off, it will be found that the skin of the penis retracts, leaving the mucous membrane still covering the greater part of the glans. This membrane must be slit up in two or three places, and its cut surface connected all round, by means of *silk* sutures, to the corresponding cut surface of the skin. In cases where the prepuce is not very long, it is sufficient to divide the skin to a slight extent on each lateral aspect, and then, having freely slit up the mucous membrane at the same points, to stitch the cut edges of the skin and mucous membrane together at each side of the incisions.

Vaccination.—Vaccinematter is generally now kept in fine tubes, which are sealed at both ends. The usual situation for vaccinating is on the upper and outer aspect of the arm (in an infant, the arm which is external, when it is being nursed, should be chosen). The operation may be performed with the point of a common lancet, not too sharp, or with Dr Weir's instrument, which consists of a handle, with four short needles at one end, and a lancet at the other. This instrument is illustrated in fig. 77. In performing the operation, the skin should first be stretched, and then a few superficial scratches made on it in two different places, about an inch apart from one another. The matter, being then placed upon the lancet, is to be gently rubbed into the scratches. If the vaccination has been successful, inflammatory symptoms show themselves on the second or third day; on the fifth day a vesicle forms, which reaches its height on the eighth day. When the vesicle is at its height, the lymph contained in it may be collected into tubes, and sealed up. The best way to procure vaccine matter from the vesicle is to make a small puncture in it, and then bring the open end of a fine tube (one of the glass tubes prepared for the purpose) in contact with the matter as it oozes out. Having filled the tube about half full, both its ends ought to be sealed up with a drop of sealing-wax. If it is desired to vaccinate other patients immediately from the vesicle, the matter may be allowed to ooze out on to the point of a lancet, so that it can be rubbed into the scratched surface prepared for it.

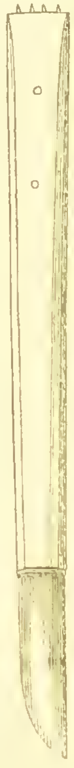
Fig. 77.

Syringing the Ear.—A syringe fitted with a small nozzle should be used for this purpose, so that a fine jet of water may be thrown into the meatus. Before injecting the water, a receptacle should be placed under the ear, immediately below its lobe, in order to catch the fluid as it rushes out. The water used ought to be warm enough to be grateful to the patient. When performing this operation, the meatus should be made as straight as possible, by drawing back the auricle; and then, the syringe having been filled, its nozzle should be carefully passed just within the canal, and the fluid injected. If one syringe-full is not sufficient, two or more must be injected in the same way.

Use of the Stomach Pump.—The stomach pump is employed to empty and wash out the stomach in cases of poisoning, or to inject nutrient fluids into it. The same kind of instrument, slightly modified, may also be used to administer enemata. The best form of stomach pump is the one shown in fig. 78, which consists of a brass syringe A, having a valve in connection with the projections B and D; one tube C, which is screwed on to the projection B; a second tube E, one end of which is pervious, and fits into the end of the syringe at D, and the other closed, rounded off, with an opening

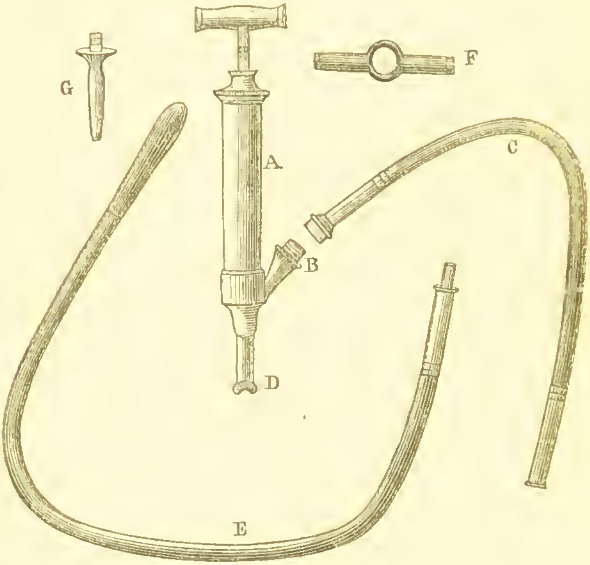

Fig. 78.

at one or both sides; and a gag, F, which is an instrument employed for placing between the teeth of patients who are insensible, or who will not open their mouths; the round hole in the centre of the gag is for passing the tube through.

In using the stomach pump to empty the stomach, the rounded extremity of the tube E, having been dipped in water, milk, or other fluid, must be passed into the mouth, carried along the dorsum of the tongue, and down the pharynx and œsophagus into the stomach. The extremity of the tube, in passing down the pharynx, is often arrested opposite the larynx; but, by curving the tube a little more, or by a little gentle manipulation, this obstruction is usually soon overcome, and the instrument glides on without difficulty. When the end of this tube is in the stomach, its other extremity must be inserted into the end of the syringe at D, and the free extremity of the tube C placed over or into a receptacle to receive the fluid pumped up. The handle of the syringe should then be worked, and the contents of the stomach will be discharged through the tube C. After the stomach has been emptied, and it is desired to wash this cavity out, or inject fluids into it, the syringe must be separated from the tube E, which should be allowed to remain in the stomach, and the tube C connected to the extremity of E; then, by placing the end, D, of the syringe in the fluid to be injected, and working the handle as before, the fluid will be pumped up, and forced along the united tubes C and E into the stomach. If the fluid injected has to be removed from the stomach again, the two tubes have only to be detached from one another, and the one, E, inserted into D, as before.

When the stomach pump is used to convey nourishing fluids into the stomach, it is only necessary to pass the tube E, as already described, and having attached its end to the tube C, to introduce the extremity of the syringe into the fluid to be injected, and work the handle. An ordinary full-sized gum-elastic catheter, and a small syringe, answer very well in many cases where it is advisable to support the patient by injecting nourishing fluids into the œsophagus.

Œsophagus bougies or forceps must be passed into the pharynx or œsophagus in the same manner as the tube of the stomach pump. These instruments should always be used with great gentleness, as their points may very easily injure the walls of these canals, especially when they are in a diseased state.

Method of giving an Enema.—The syringe of the stomach pump and the tube C, with the addition of an ivory piece shown at G, fig. 78, may be used to give injections. India-rubber bags and other appliances may also be usefully employed for the purpose. In administering an injection, the ivory piece, having been well oiled, should be gently introduced through the anal orifice, and held steadily there while the syringe is being worked. Great care should be taken not to injure the walls of the rectum with the point of the ivory tube. The fluids usually injected into the rectum are—(1), Warm water alone. From a few ounces to a pint of warm water is often a very efficacious enema when it is not desired to act strongly on the bowels. (2), Half-an-ounce or an ounce of castor oil, a dessert or table-spoonful of common salt, salts and senna or turpentine added to a few ounces or a pint of warm water or thin gruel, form the purgative enemata most generally used. (3), A tea-spoonful of laudanum or other fluid sedative, added to a few ounces of thin starch or gruel, is the sedative injection usually employed. (4), Beef tea or other soups, milk, wine, brandy, or other nourishing and stimulating fluids are frequently injected into the rectum, in order to support or revive a patient's strength.

Passing Rectal Bougies.—The house-surgeon or dresser is sometimes required to introduce bougies or tubes into the rectum. In doing this, the instrument must first be well oiled, passed carefully through the anal orifice, and gently pushed on in the direction of the curves of the canal. If the instrument catches, its point ought to be slightly withdrawn, and then glided gradually onwards again in the proper direction.

AMPUTATIONS OF THE FINGERS AND TOES.

Amputation of the Distal Phalanx of the Fingers.—Amputation of this phalanx is not so often required as the removal of the entire finger; for in the case of disease confined to the distal phalangeal bone, the removal of the diseased bone is usually sufficient, and therefore the soft textures do not need to be taken away. Injuries which are confined to the last phalanx will rarely admit of a regular amputation being performed, owing to the loss of the soft textures, so that the best thing we can do in the most of these cases is to remove any loose or projecting portions of bone, and in this way allow the soft parts to heal. We occasionally, however, meet with cases in which it may be advisable and possible to remove the last phalanx by a regular amputation. For instance, tumours growing from the bony or soft textures of the distal phalanx, and confined to it, may be removed by an amputation at this situation.

If the case permits of a regular amputation being performed, the best plan is to take a good flap from the palmar surface of the extremity of the finger, and then to turn this flap over, so as to cover the end of the second phalangeal bone. In making this flap, we may either do so by transfixion, and then cutting across the joint, or, what is better, we may first cut across the dorsal aspect of the joint, and, having opened into it and divided the lateral ligaments, then cut the palmar flap. The palmar flap ought to be made as long and bulky as possible, in order that it may cover the exposed bone. If sufficient flap cannot be obtained to cover the bone, the articular extremity of the second phalanx may be cut off with the saw or bone-forceps; A A, in fig. 79, show the line of the incisions for this amputation.

Amputation of the Second Phalanx of the Fingers. —When more than the extremity of a finger requires to be taken away, it is in the majority of cases much better to remove the whole finger. The exceptions to this are in the case of the index finger and thumb; for, in people who require to use their hands much, any portions of these digits that can be saved will often ensure usefulness to the hand implicated. Again, when several of the fingers require to be removed, or have been previously wanting, even a small bit of any finger may maintain some usefulness to the hand, especially if the thumb, or a portion of it, remain.

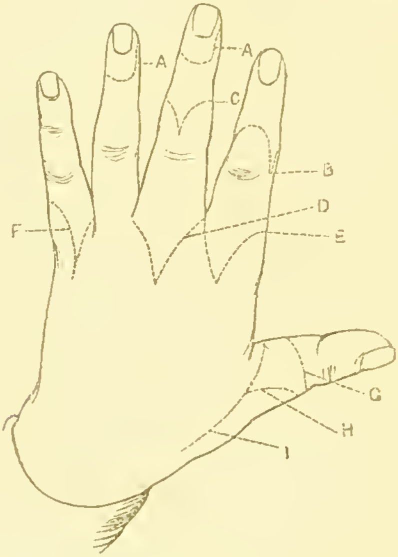

Fig. 79.

Fingers may be removed at the joint between the second and distal phalanges, or at any point in the extent of the second phalanx, by sawing through the bone. In either instance, two flaps of equal length should be taken from the dorsal and palmar surfaces, or from the lateral aspects (whichever be most convenient), as is shown in fig. 79, by the lines B, C. It may not always be possible to obtain two flaps in this amputation; and therefore, in such cases, we must endeavour to make one long single flap from the most convenient situation, and turn it over as in the amputation of the distal phalanx.

Amputation at the Metacarpo-phalangeal Joint of the Fingers.—Amputation of all the fingers at this joint is performed on the same plan—namely, by cutting a flap from each side, and then removing the finger by disarticulation. In the case of the index and little fingers, it is generally advisable to make the flap on the exposed aspect of the stump a little longer than the other, so that the line of the cicatrix may be turned away as much as possible from this surface (see the lines D, E, and F, fig. 79). For example, in amputating the index finger, the outer flap should be made sufficiently ample to turn over the exposed metacarpal bone, in order that the cicatrix of the wound may be close to the base of the middle finger. In amputating the thumb at this joint, I have found that a circular amputation, or one made by taking two short semi-lunar flaps from the sides of this digit, gives the best results. The circular operation is a little more tedious in its performance, but its advantages are that it does not interfere with the ball of the thumb, and the cicatrix left when the wound is healed is very small. In doing this amputation, the soft textures must be well retracted by an assistant, and then an incision is to be made round the thumb, about half-an-inch above its metacarpo-phalangeal joint, the knife being carried quite down to the bone, so as to divide all the parts superficial to it. Having carefully separated these tissues by cutting round the bone, and close to it, the joint should be opened into, and disarticulation accomplished. If sufficient flap be not obtained in this way, the head of the metacarpal bone may be cut off.

The amputation, by two semi-lunar flaps, is easily performed, by cutting first one flap, and then the other, exposing the joint and disarticulating.

The lines of incision for the circular and flap amputations of the thumb at this joint are shown at G, H, fig 79.

In amputating the ring and middle fingers at this joint, two equal flaps are to be made in the following manner :—

Enter the point of the knife over the centre of the dorsal aspect of the joint, and then carry the knife (first on one side and then on the other) obliquely down through the middle of the web uniting the fingers, as far as its free edge. When this edge is reached, the incision should be carried round the base of the digit to be removed, so that the palm of the hand be not encroached upon; the articulation is in this way thorougly exposed, and disarticulation can be readily accomplished. If it is not possible to obtain two lateral flaps in amputating these or the other fingers, a covering for the ends of the metacarpal bone may be obtained by cutting one long single flap from the palmar, dorsal, or lateral aspect of the digit.

In removing the index and little fingers, the two flaps may either be made before disarticulating, as in the case of the other fingers, or one flap may be first cut, the joint opened into and disarticulated, and then the second flap formed.

We must here consider for a moment the question in regard to the removal of the head of the metacarpal bone in all these amputations. Experience has shown that it is better to take away the head of the metacarpal bone when we remove the fingers at this joint. The removal of this portion of bone allows the parts to be brought more intimately together, and therefore diminishes the amount of deformity in the hand; and this proceeding has been found not to interfere with the after strength of the hand. In the case of the index and little fingers, the head of the metacarpal bone should be sawn off obliquely, so as to avoid any undue prominence of the divided bone. In amputating the thumb at this joint, it is better to leave the head of the metacarpal bone uninterfered with, provided there be sufficient flap to cover it properly.

Amputation of the Fingers, together with their Metacarpal Bones.—When the metacarpal bone of the thumb or fingers is affected with disease or injury, the corresponding digit not being implicated, it becomes a question whether or not we should attempt to save the finger or thumb by removing only the injured or diseased bone. The metacarpal bones of the thumb and fingers may, in some instances, be excised alone with a successful result. In favourable cases, it will therefore be right in this way to attempt to save a thumb or finger (especially if it be an index one). When both the metacarpal bone and finger or thumb are affected, we must remove them together; and in most cases it will be proper to remove the entire metacarpal bone, especially if the operation be performed for disease. The best method of removing a metacarpal bone, together with a finger or thumb, is to carry an incision along the dorsal aspect of this bone, commencing at a point over its carpo-metacarpal articulation, and terminating at the centre of the metacarpo-phalangeal joint. The two lateral flaps usually made for the removal of a finger, or, in the case of the thumb, the two short semi-lunar flaps, or the circular one, should then be cut, the tissues dissected from the metacarpal bone, the carpo-metacarpal joint disarticulated, and the entire digit, together with its metacarpal bone, in this way removed. In separating the tissues from the metacarpal bone, the knife ought to be kept close to the bone, in order to avoid injuring the important structures in the palm of the hand. This operation may also be performed by entering the knife over the carpo-metacarpal joint, running it along the dorsal aspect of the metacarpal bone as far as the centre of the knuckle, and then, without lifting the knife, carrying the incision round the base of the finger to be removed, so as to join it with the dorsal one. The line of incision for the removal of the metacarpal bone of the thumb is given at I, fig. 79.

It occasionally happens that we may require to amputate more than one digit, sometimes almost the whole digits, for injury or disease. In such cases we must make a flap or flaps from the most convenient situation, so as to cover the exposed bones. No rules can be laid down in regard to such operations, but the surgeon must be guided by the circumstances of each particular case. The saving of even a small portion of a finger may be of great service in these cases.

Amputations of the Toes.—Amputation of the toes is to be performed on the same principles as amputation of the fingers. It very rarely happens (except in the case of the great toe) that a partial amputation of these digits is required, or is advisable, for the stump left by such an operation would, in most cases, be an inconvenience.

In amputating the first phalanx of the great toe, the same incisions are to be employed as in the removal of this part in the fingers—a good flap being taken from the plantar aspect of the extremity of the toe, as shown at A, fig. 80. If more than the first phalanx of this toe requires to be removed, without also necessitating the cutting off of the head of the metacarpal bone, I have found that a circular amputation (the line for which is illustrated at B, fig. 80), at the metatarso-

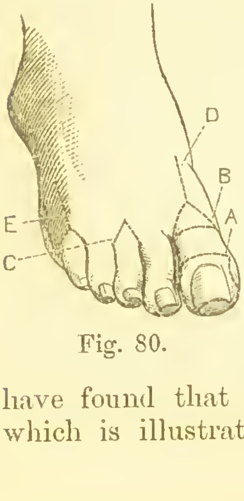

Fig. 80.

phalangeal joint, performed on the same principle as that at the corresponding joint of the thumb, leaves a useful stump.

The smaller toes are best removed at their metatarso-phalangeal joints, by the same method which has been recommended for taking away the fingers at their metacarpo-phalangeal articulation, the plantar aspect of the foot being kept intact (see C, fig. 80). It will not always be necessary to remove the head of the metatarsal bone in this amputation, as it lies deeper and more protected than the corresponding part of the metacarpal bone. In amputating the little and great toes at this joint, it will be advisable to make the one flap sufficiently free, so that the cicatrix may be away from the exposed surface of the stump. In cases where sufficient flap cannot be obtained to cover well the head of the metatarsal bone of these toes, this portion of bone ought to be removed, as its prominence may lead to inconvenience when the stump is healed.

When the metatarsal bones are alone diseased, they may be removed, without interfering with the toes, in favourable cases; but when the phalangeal bones are implicated as well, both the toe and the entire metatarsal bone must be taken away. The removal of portions of the metatarsal bone for disease is not, as a rule, good practice; for pathology shows that although the disease may apparently affect only the extremity of this bone, its whole osseous texture is usually involved. The great and little toes are the ones most frequently requiring to be removed, together with their metatarsal bones; for when the metatarsal bones of the other toes are diseased, and do not admit of resection, a partial or complete amputation of the foot will generally be advisable.

In amputating a toe, together with its metatarsal bone, an incision is to be commenced over the tarso-metatarsal joint of the toe to be removed, and is then to be carried along the dorsal aspect of the metatarsal bone, as far as the metatarso-phalangeal joint, as represented at D, E, fig. 80. When this point is reached, the two lateral flaps are to be cut from the sides of the toes, the metatarsal bone carefully dissected from its connexions, and then, by disarticulating at the tarso-metatarsal articulation, the toe and its metatarsal bone are readily separated together. In dissecting the tissues from the bone, the knife must be kept close to it, so as to avoid the blood-vessels and other tissues in the sole of the foot. In performing this operation on the great toe, considerable difficulty is often experienced in securing the dorsal artery of the foot when wounded, as it lies in the space between the first and second toes. Both ends of this vessel ought to be carefully tied if it is wounded, for troublesome hæmorrhage may result if this is not done.

After amputations of the fingers and toes, inflammation and suppuration occasionally spread up into the hand or foot. It is not very uncommon, after many of the partial amputations performed on the fingers, to have abscesses forming in the hand, or even in the forearm, giving rise to much pain, and delaying the satisfactory healing of the stump. When this takes place, any stitches which are causing tension should be removed from the stump, warm fomentations diligently applied, and if suppuration takes place, incisions must be made to give exit to the matter.

POST-MORTEM EXAMINATIONS.

Any region of the body may be examined after death by ordinary dissection; but in all cases where it is possible, the different cavities should be examined in order, so that the condition of all the important organs or viscera may be ascertained. Before making a post-mortem examination, it is most convenient to have the body laid on a board or table, and divested, as much as possible, of all coverings. It is of special consequence, in making such examination in private houses, that all articles of clothing in connection with the body should be kept clean, so that, when they are replaced, they may look as unaltered and neat as possible.

The first thing to be done, in making a post-mortem examination, is to note carefully the external condition of the whole body. The amount of emaciation and putrefaction should be observed, as well as any peculiarity in its conformation. Any external marks, bruises, or wounds, should be carefully examined, especially if the case is a medico-legal one, and their nature (whether recent or old, ante-mortem or post-mortem), extent, direction, and depth determined. When these facts have been ascertained, the different regions should be examined in the following order:—

Head.—It is much better to examine this portion of the body before cutting into the thoracic or abdominal cavities. The head having been supported on a block, an incision should be carried from one ear over the top of the head to the other ear, and should pass quite down to the bone. The scalp is then to be torn off, one flap being drawn backwards over the occiput, the other forwards over the forehead and face. When the vault of the skull has thus been exposed, the knife should be carried round the cranium at a line which will pass across the middle of the forehead through the upper part of the temporal muscles and a little above the occipital protuberance, so that any remaining soft textures may be divided, and the saw applied more readily. The upper part of the skull or calvaria is then to be removed by sawing through the bone along this line. The bone may be sawn completely through, or only partially, the separation being completed in the latter instance by means of the chisel and mallet. Whichever method is adopted, care must be taken to avoid injuring the membranes of the brain. When the calvaria has been removed, the surface of the dura mater, and the condition of the longitudinal sinus and the blood contained in it, should be examined, and any pathological changes in these structures noted. After this has been done, the dura mater must be carefully divided (a probe-pointed bistoury is the best instrument for the purpose) all round along the line at which the bone has been sawn, and turned up on each side of the brain, then, by dividing the falx cerebri in front, the whole membrane can be drawn backwards and the upper surface of the brain thoroughly exposed. After this, the arachnoid membrane should be examined and its condition determined, the amount and nature of any fluid in the subarachnoid space ascertained, and the state of the pia mater observed. The hemispheres of the brain may now either be sliced as far as the lateral ventricles without removing the organ, or the entire brain may be taken out whole and then examined. When the brain has been removed, it should be weighed and its different portions carefully examined. The interior of the base of the skull ought then to be investigated, and, if it be desirable to examine the orbit, the roof of this cavity should be removed as is done in the dissecting room. If the ear requires to be dissected, the temporal bone should be cut out by sawing through the bone behind the mastoid process, and also in front of the ear down to the base of the skull.

Spinal Canal and Cord.—To examine these, the posterior aspects of the whole vertebræ must be exposed, by making an incision from the back of the head to the sacrum, and dissecting off the muscular and other tissues. The laminæ of the vertebræ must then be sawn through, cut with forceps, or divided by means of a chisel and mallet. In doing this, the laminæ should be divided or sawn close to the spinous processes, otherwise the thoracic, abdominal, or pelvic cavities may be opened into. When the whole laminæ have been divided, they must be removed, the condition of the dura mater, arachnoid, and pia mater ascertained, and the amount of fluid in the subarachnoid space noted, and the cord itself carefully taken out. In taking out the cord, it is necessary to divide the spinal nerves on each side outside the dura mater. The cord, after it has been removed, should be sliced and its structure examined, and if it be in an abnormal condition, a microscopic investigation of it will be advisable.

Thorax, Abdomen, and Pelvis.—These cavities are generally exposed by an incision, commencing at the lower part of the neck, and carried down the centre of the thorax and abdomen as far as the pubes. In making the incision through the walls of the abdomen, it is best first to make a small opening into this cavity at its upper part, and then, having introduced one or two fingers into it, the knife may be quickly run down the whole length of the abdomen, the fingers passing along with it and raising up the walls from the viscera, so as to prevent them being wounded. The thoracic and abdominal muscles, together with the skin, are then to be dissected off the external surfaces of the ribs and costal cartilages on each side, and the cavity of the chest opened by cutting through the cartilages of the ribs close to where they join their respective bones, disarticulating the sternum at the sterno-clavicular articulations, or sawing across the manubrium, severing the attachment of the diaphragm, and then removing the sternum and cartilages of the ribs. When the chest has been opened, the position of its different contents should first be observed before disturbing them, and any alteration in their usual relation to one another noted. The pleural cavities and the pericardium should next be examined. If they contain any fluid, its amount should be ascertained by measurement, and its nature determined; and, if adhesions exist, their extent and nature should also be observed. The lungs and heart may then be taken out separately, or both heart and lungs may be taken out together. The condition of the lungs and bronchi should be ascertained by slicing the lung substance, and slitting up the bronchial tubes. The cavities, valves, and large vessels connected with the heart ought next to be examined in order, commencing with the *right auricle.* This cavity is best opened by first making an incision into it, which should extend from one vena cava to the other, and then a second one at right angles to the first, which should pass into the auricular appendage. The *right ventricle* is to be opened by cutting a V-shaped flap through its anterior wall, the apex of the V being below the base above, and turning it upwards. The valves (tricuspid) connected with the auriculo-ventricular opening should be first examined in position, and then by cutting through the margins of this orifice, their structure will be fully exposed. The semilunar valves of the pulmonary artery should also be exposed by slitting up this vessel, so as not to injure any of them. The *left auricle* is best opened by making into its posterior wall an incision, which should extend from the pulmonary veins on one side to those on the other. The *left ventricle* is opened in the same way as the right, by cutting a triangular flap through its wall, sufficiently large to expose the cavity. The valves (mitral) in connection with the auriculo-ventricular opening must be looked at in position, and then more thoroughly exposed by dividing the margins of the opening. The semilunar valves of the aorta are readily made apparent by slitting up the vessel. In examining the different cavities of the heart, the amount, position, and nature of any clots or fluid blood contained in them should be first determined, and when this has been done, they should be washed out, in order that the condition of the valves, and the structure of the heart itself, may be better ascertained.

Tongue, Larynx, Trachea, and Œsophagus.—These parts are best examined after they have been removed from the body. The best way to cut out these structures is to make an incision from the chin to the sternum, to dissect off the skin and muscles from the larynx and trachea, to cut through the muscles connected with the tongue and jaw, and then remove a portion of the pharynx, the tongue, larynx, trachea, and œsophagus together. The different canals may then be slit up, and their condition determined.

Abdomen.—Before interfering with the viscera, their relation to one another and to the peritoneum should be observed, and the condition of the latter structure noted. Should adhesions be present, their extent and position should be carefully determined. If any fluid exists in the peritoneal cavity, its nature and amount should be ascertained. The different viscera should then be carefully removed and examined in the following order:—

The Intestines and Stomach.—It is generally most convenient to commence the removal of these viscera by dividing the mesentery at some portion of the upper part of the small intestines, and detaching them, by running the knife along this structure close to its line of attachment to them. The whole of the intestines having been separated in this way, two ligatures must be applied round the gut at the point where the separation was commenced, and its canal divided between them; two ligatures should also be passed round the upper part of the rectum, and the intestine divided in the same way. By this means the whole intestines will be removed. In taking out the stomach, great care must be exercised to prevent the escape of any of its contents, especially in cases of poisoning, or other medico-legal cases. For this purpose, two ligatures ought to be tied round the œsophagus close to the diaphragm; and, if the upper part of the intestinal canal has not already been secured, other two ligatures should be tied round the duodenum. The intestines, after their removal, should be washed out, slit up along the border of their mesenteric attachment, and the condition of their interior examined. The stomach is best opened by an incision along its lesser curvature. If the case is a medico-legal one, its contents should be carefully preserved for analytical examination.

Spleen, Pancreas, Kidneys, and Liver.—These viscera should be removed and examined in the order mentioned, and the condition of their structure ascertained by slicing, and, if advisable, by microscopic examination.

The different thoracic and abdominal viscera should be weighed, and a note of their weight taken. I append a copy of the table of the average weight of the viscera as at present in use in the Edinburgh Pathological theatre.

Average Weight of Viscera in the Adult.

	MALE.		FEMALE.	
	℔	oz.	℔	oz.
Brain, . .	3	1½	2	12
Heart, . .	0	11	0	9
Lungs, . .	2	13	2	0
Liver, . .	3	5	2	12
Pancreas, .	0	3	0	2¾
Spleen, . .	0	6	0	5½
	Right.	Left.	Right.	Left.
Kidneys, .	5¼	5½	4¾	5

The following table is M. Bizot's mean measurement in lines (12 lines to an inch) of the four orifices of the heart:—

	AURICULO-VENTRICULAR ORIFICES.		ARTERIAL ORIFICES.	
	MALE.	FEMALE.	MALE.	FEMALE.
Left	$45\frac{17}{30}$	$41\frac{1}{3}$	$31\frac{15}{61}$	$28\frac{4}{5}$
Right	$54\frac{12}{61}$	$48\frac{1}{4}$	$32\frac{21}{61}$	$30\frac{7}{60}$

Pelvis.—The relation and condition of the contents of this cavity ought to be noted before they are interfered with. If the subject be a female, the condition of the ovaries, uterus, and appendages may sometimes be ascertained before they are removed; but, in most cases, it is more convenient, both in the case of females and males, to take out all the contents of the pelvis together, and then examine them; the bladder, rectum, uterus, and vagina being slit up, and their condition ascertained.

In order to investigate satisfactorily the condition of the bladder, prostate, and urethra in the male, the front of the pubes should be taken out along with them, by sawing through the bone on each side of the symphisis.

When the whole of the cavities have been examined, the viscera should be replaced, the sternum and cartilages of the ribs adjusted in their natural position, and the longitudinal incision stitched up, commencing at the pubes. In sewing up the body, strong silk or thin twine ought to be used, in the form of the continuous suture, and the needle should always be introduced from the inner surface of the wound.

When the edges of the wound have been neatly brought together, the body should be cleaned, the hair arranged smoothly, and the burial or other clothes neatly adjusted.

CHAPTER VIII.

CASE-TAKING.

It is the duty of the house-surgeon, dresser, or clerk, to keep a record of all cases admitted into hospital, and as these records may have afterwards to be referred to or reported, it is very necessary that they should be as complete as possible, and, at the same time, brief. In most hospitals books are provided for the purpose of recording cases. These books should have an index at the beginning or end, by means of which a case can be readily found if wanted. The best index is one like the following:—

No. of Case.	Name and Surname.	Age.	Date of Admission.	Page at which Entered	Disease or Injury	Date of Dismissal.	Result.

"Taking" a surgical case may be considered under six sections.

First Section.—Under this should be entered the patient's name and surname.

Sex.
Age.
Married or unmarried.
Occupation.
Place of abode.
Date of admission.
Number of ward.
Name of surgeon under whom admitted.

In cases likely to come under judicial investigation, the hour as well as the day at which the patient was admitted should be stated. If the disease or injury be quite apparent, it may be mentioned in this section.

Second Section, or a history of the patient. This should include a particular account of the cause, commencement, previous symptoms, progress, and treatment of the disease under which the patient is labouring. If the patient is suffering from an injury, the manner in which it was inflicted, the agent which produced it, and the position and state of the patient at the time, should be described.

Third Section, or the patient's state on admission. Under this section should be given an account of the patient's general health, and a careful description of his or her local disease or injury, its situation, connection with surrounding parts, symptoms, and any other facts in relation with it. If the case be one of tumour or other swelling, the shape, size, depth at which situated, consistence, connection with surrounding tissues, and the state of the neighbouring lymphatics and glands, should be inquired into and noted. If there is a wound, sore, or sinus, its nature, extent, direction, and depth, and the condition of the surrounding textures, should be described. If the case be one of injury, the tissues implicated, the extent of their implication, and any deformity or displacement of them should be recorded. Any remark of the acting-surgeon in regard to the nature of the case may also be noted under this section.

Fourth Section consists of an account of the operation or other treatment employed for the relief of the disease or injury, soon after the patient's admission; the further treatment being given under the next section. If an operation has been performed, the use or non-use of chloroform, the amount of bleeding, and any other particulars of importance, should be mentioned. When the operation has been done according to established rules, its details need not be related; but if a new method of operating, or any modification of an old one has been used, it should be fully described. This section must also include any local or general treatment which has been adopted. If any applications have been made, or any appliances used, their nature and method of employment must be stated. When a limb, tumour, or other portion of tissue has been removed by operation, an account of the anatomy, pathology, and, if need be, microscopic structure of its textures, should be given. If fluids have been taken from a patient, by tapping or otherwise, a note of their consistence, chemical composition, and character should be made.

Fifth Section will include a report of the patient's progress made daily, hourly, every two or three days, or weekly, according to the importance of the case. Any treatment which has been adopted, any further operations that have been performed, or any changes which may have taken place in the local disease or injury, should be carefully noted under the proper date.

Sixth Section.—In this section the patient's date of dismissal must be entered, with an account of the condition in which he leaves the hospital (especially as regards the disease or injury for which he was admitted), whether cured, relieved, or not cured. If the patient dies, the date and hour of his death should be stated, and any causes which may have led to the fatal termination; and if a post-mortem examination is made, a note of the condition of the various organs and regions examined should be added.

For the sake of illustration, let me report shortly two simple surgical cases.

TUMOUR OF THE LOWER JAW.

Case I.—J. L., male, about 40, married, ploughman, from ——, admitted March 6, 1856, into ward ——, under the care of Mr ——, on account of a swelling of the lower jaw.

The patient states that, six years ago, shortly after receiving a blow upon the right side of the face, he noticed a swelling over the jaw. When first observed, the tumour was about the size of a small nut. It was not then painful, but for the last few months he has suffered a good deal of uneasiness in it. The tumour has been slowly increasing in size. Two months ago he applied to a medical man for advice, and was recommended by him to poultice the swelling. He continued this treatment for several weeks, but without any benefit; and he was, therefore, advised to come to this hospital.

On admission, the patient's general health is good, and he suffers from no other complaint, except the tumour of his jaw. On examining the tumour, which is about the size of a small orange, it is found to be of a rounded shape, hard to the touch, and firmly connected to the jaw. The skin over the surface of the tumour is natural in appearance, and freely moveable. The tumour principally projects externally, but also forms a slight prominence on the interior aspect of the bone, and extends from the ramus of the jaw to the right canine tooth. The glands of the neck are healthy. Mr ——, after examining the case, pronounced it to be a fibrous tumour of the lower jaw, requiring excision of the right half of that bone.

March 10*th.* To-day the right half of the jaw, together with the tumour, was excised by Mr ——, the patient being under the influence of chloroform at the time. Very little blood was lost during the operation.

An examination of the tumour showed that it had originated in the interior of the bone, and had gradually absorbed its outer table on the external aspect of the jaw, so as to project through it. The section of the tumour was firm in consistence, of a white colour, and yielded no cancer juice. The microscopic structure of the tumour consisted of fibres and elongated nucleated cells.

Vespere.—The patient has been quiet since the operation, and expresses, by signs, that he feels easy.

11*th.* Has passed a good night, pulse 95, the edges of the wound are well together.

12*th.* Is going on well, the external part of the wound has apparently united by first intention along its whole extent. The bowels have not been moved since the operation. Pulse 94. Ordered an enema.

14*th.* Three stitches removed from the wound. The enema yesterday brought away a copious stool. Pulse 90.

16*th.* All the remaining stitches taken out. The wound healed, except at one small point. Patient feels stronger to-day.

18*th.* The entire wound is now healed. Bowels were opened yesterday. Pulse 89.

22*nd.* Patient sat up to-day for the first time since the operation, and is rapidly gaining strength.

April 4th. The patient was dismissed quite well. There is wonderfully little deformity of the face.

FRACTURE OF THE BASE OF THE SKULL.

CASE II.—J. C., female, aged about fifty-five, unmarried, washerwoman, from ——, admitted June 12, 1865, at three o'clock P.M., into ward ——, under the care of Mr ——, for an injury of the head, supposed to have been caused by a fall down stairs.

The policemen who brought her to the hospital state that she was found lying at the bottom of a stair in —— Street, about half-an-hour ago, quite insensible. She had been drinking for several days, and, when last seen, was intoxicated.

On admission, the patient was perfectly insensible, her breathing was laboured and stertorous, her pupils dilated and fixed, her pulse irregular, and there was bleeding from the right ear. On examining the head, no fracture or depression could be detected, neither were there any other marks of injury on her person. Mr —— having been asked to see the case, diagnosed it to be one of fracture of the base of the skull, and ordered the patient to be kept quiet and to have the hair cut short, and an enema administered if sensibility did not return before evening.

Vespere.—The patient still remains insensible, and the breathing stertorous. Enema administered.

13*th.* The patient continues insensible. There has been a little restless movement of the limbs, pulse feeble and irregular.

14*th.* To-day the patient's pulse became very feeble, the surface of the body cold, and she died about four o'clock P.M., never having regained any sensibility.

(An account of the *post-mortem* examination should be added, if one was made.)

PREPARATION AND PRESERVATION OF PATHOLOGICAL SPECIMENS.

Pathological specimens are preserved either in the dry state or in spirit. The former are usually termed "dry" preparations, the latter "wet" preparations.

Bones.—Bones may be prepared by maceration, by drying, or by emersion in spirit. The first method is preferable when only the osseous tissue is wished to be preserved. In macerating a bone, the periosteum and as much of the muscular tissue as possible should be left in connection with it. The bone should then be placed in a jar or other receptacle containing cold water, and allowed to remain in it (being completely covered by the water) until it is found that the periosteum and other tissues are easily separated from its surface. The top of the jar should always be covered to prevent any dust getting in. The water in the jar must *never* be changed until the soft parts have become separated from the bone. When this has taken place, the bone may be placed in a little clean water for a day or two before it is dried. When the bone has become quite clean, it should be hung up to dry, care being taken to protect it from being soiled or affected by dust. Bones can also be macerated, so as to make their structure beautifully clean and white, by allowing the soft textures in connection with them to become softened by putrefaction before the preparation is placed in water. I have frequently macerated the bones of the extremities in this way, with the most satisfactory results, the limb having been first buried for a week or two, and then kept in water as long as might be necessary.

The bones of old people and certain other individuals are often difficult to macerate, owing to the large amount of fatty matter contained in them. A peculiar kind of hard grease (adipocere) sometimes forms in connection with bones and other tissues when they are macerated. This grease prevents them becoming properly cleaned, and I am not aware that any satisfactory remedy has as yet been discovered for counteracting the formation of this substance.

When the periosteum as well as the bone is to be preserved, it is in most cases best to dry the preparation. The soft textures should first be carefully dissected from the periosteum, and this membrane supported, if need be, by placing a little dry cotton wadding or horse hair between it and the bone. The preparation ought then to be hung up in some situation where there is a draught of air, and kept there till it is thoroughly dried, when it may either be placed in a glass jar or varnished. If such a preparation requires much dissection, or if the weather is warm and putrefaction likely to occur, it will be better to keep it in strong spirit for a day or two before hanging it up to dry.

Bones which have soft tumours or other textures in connection with them, should be preserved in spirit. In this, as in all other "wet" preparations, the specimen ought to be placed at first in strong spirit so as to harden it well, after which it may be kept in spirit diluted with water (one part of water to three of spirit). The spirit now generally used for this purpose is the methylated spirit. If it be desirous to show the internal structure of the bone in connection with tumours or other disease, sections should be made through it in the most convenient direction. Sections of the larger bones are most conveniently made with a fine saw, but I have found that sections of the smaller bones can be most satisfactorily made with a sharp knife and hammer.

Joints.—Joints may be macerated in the same way as bones, if it is only the articular extremities of the bone which require to be preserved; but if it is advisable that the soft textures also should be kept, the preparation must be placed in spirit.

Muscles, Tendons, Arteries, Aneurisms, Cysts, Intestines, and **Mucous** or **Serous Canals, Membranes,** or **Cavities** may be preserved by drying or emersion in spirit. When any of these structures are dried, they should first be carefully dissected and cleared from all fat as much as possible, and then hung up to dry, care being taken to fix the preparation so that it will dry in the form desired. If the preparation be a flat membrane or cord, it will be convenient to stretch and secure it on a board. If it contain cavities or canals, these should be stuffed or expanded with cotton wadding, horse-hair, or wool, in order to make them assume and retain their proper size and shape. Intestines and some other cavities or canals, with thin walls, may be made to retain their form by inflating them with air before drying them. When such preparations are dry, they may be placed in a glass jar or varnished. When these structures are to be preserved in spirit, they must first be carefully prepared by dissection, and by stuffing if necessary, then placed in strong spirit, and, when well hardened and properly cleaned, "put up" neatly in glass jars of proper size and shape. In order to get "wet" preparations thoroughly cleaned, it may be necessary to change the spirit in which they are immersed several times before they are finally "put up." Before placing "wet" preparations in strong spirit, it is of great consequence that they should be fixed or suspended in the exact position in which they are desired to be preserved; for if this is not done at first, it is difficult to alter them after they have become hardened by the spirit.

Tumours.—Tumours and other portions of soft texture are, in the majority of instances, best preserved in spirit. Before placing such preparations in the spirit, they should be carefully dissected, so as to show as distinctly as possible the particular characters which distinguish them. In many instances it will be advisable to make sections of such specimens, and in doing this the sections ought to be made in the direction and to the extent which will most conveniently illustrate the disease or tissue. Some tumours and other pathological preparations may be usefully injected, to show their vascularity or any peculiarity in the distribution or arrangement of the blood-vessels contained in them.

Coagulated or extravasated blood in connection with ulcerated surfaces, tissues, or cavities may be made to retain its natural colour and consistence by exposing the preparation for a minute or two to the heat of a strong fire before emersing it in spirit.

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